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Guidance Manual: Cost Estimates for Closure and Post-Closure Plans (Subparts G and H). Volume 2 Land Disposal Facilities

Pope-Reid Associates, Inc., St. Paul, MN

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This [illegible] is intended for use both by TSDF owners/operators who prepare closure and post-[illegible] cost estimates for land disposal facilities and by regulatory officials who r[illegible]e cost estimates for 40 CFR Parts 264 and 265 Subpart H.

This volume purpose is [illegible]vide a framework for developing the closure and post-closure cost estimates for land disposal units (waste piles, surface impoundments, land treatement facilities, and landfills).

This volume contains closure cost estimating worksheets for each land disposal unit type, as well as worksheets for estimating post-closure costs, and summary worksheets.

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GUIDANCE MANUAL: COST ESTIMATES FOR CLOSURE AND POST-CLOSURE PLANS (SUBPARTS G AND H)

VOLUME II - LAND DISPOSAL FACILITIES

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CHAPTER 1

INTRODUCTION

Subpart H of Part 264 and Part 265 of the RCRA Subtitle C regulations requires that owners/operators of all hazardous waste treatment, storage, and disposal facilities (TSDFs) prepare an estimate of the cost for closing the facility in accordance with the RCRA regulations. In addition to the closure cost estimates, TSDF owners/operators are to prepare estimates of the cost of post-closure care for those facilities at which wastes will remain after closure. Financial assurance must be established for closure and post-closure, the amount of which is based on these cost estimates. Reviewers of closure and post-closure cost estimates need to be able to determine whether the cost estimates are reasonable in order to assess the adequacy of the closure and post-closure financial assurance. This involves consideration both of the closure and post-closure plans and of the unit costs and calculations used to develop the cost estimates.

This is Volume II of the Guidance Manual: Cost Estimates for Closure and Post-Closure Plans (Subparts G and H). The purpose of this volume is to provide a framework for developing the closure and post-closure cost estimates for land disposal technologies. It is intended for use both by TSDF owners/operators who prepare closure and post-closure cost estimates and by state and EPA Regional personnel who are responsible for reviewing the cost estimates. This volume contains the worksheets for estimating closure and post-closure costs (including contingent cost estimates) for waste piles, surface impoundments, land treatment, and landfills. In addition, it includes summary worksheets for totalling the facility costs.

Following this introduction, Volume II is divided into six major chapters. The first four contain closure cost estimating worksheets for waste piles, surface impoundments, land treatment facilities, and landfills, respectively. The fifth chapter contains worksheets for estimating post-closure costs. The final chapter of this volume contains the summary worksheets; it is identical to the summary chapter in Volume I - Treatment and Storage Facilities.

Within each chapter, the worksheets are grouped by letter to indicate technology and by number to indicate individual worksheets. For example, the Inventory Management worksheet for waste piles is Worksheet D-1; the Final Cover worksheet for landfills is Worksheet G-6. All worksheets can be used for estimating both Part 264 and Part 265 costs except those for groundwater monitoring. There are separate Part 264 and Part 265 worksheets for this activity because the regulations differ.

The worksheet blanks to be filled in are arranged in two columns. All facility data, unit costs, and intermediate calculations are placed in the left column. Results of all subtotal calculations are placed in the right column. The final line item in each worksheet is a subtotal that is entered in a box. This is the sum of all costs in the right column.

For the user's assistance, typical unit costs and a page number reference are provided in parenthesis to the left of the worksheet blanks. In some cases, a typical cost is not shown but a page number(s) is referenced. The page number reference refers to Volume III - Unit Costs. Volume III contains information and guidance on unit cost ranges, typical unit costs, and how the unit costs are applied in various facility situations. If the user needs guidance for any closure or post-closure activities, the user should refer to the referenced pages in Volume III.

The worksheets were designed to be as complete and detailed as possible, so some of the worksheet items/sections may not be applicable to particular facility situations. The user should ignore such sections and feel free to adjust the worksheet formats as necessary to maximize their usefulness. The worksheets are not intended to be used for assessing the adequacy of the closure and post-closure plans themselves or for determining which regulations apply to the facility being evaluated. The user of this document should already have developed or reviewed the content of the closure and post-closure plans and have determined that they are adequate before using the worksheets to prepare or assess the cost estimates. To assess the adequacy of the plans, the user should consult guidance documents such as permit writers' guidance manuals and technical resource documents on specific subjects. Two examples of such documents are Closure of Hazardous Waste Surface Impoundments (SW-873) and Evaluating Cover Systems for Solid and Hazardous Waste (SW-867). EPA has prepared a closure/post-closure plan guidance document that is a companion to this document. It is entitled "Draft RCRA Guidance Manual for Subpart G Closure and Post-Closure Care Standards and Subpart H Cost Estimating Procedures," and it could be used as a guide for evaluating the plans themselves.

The worksheets are arranged by type of TSDF so that all of the relevant worksheets are included for each type of waste management unit or technology. However, an owner/operator may plan on closing more than one type of unit or technology at a given time (e.g., closing a landfill and a surface impoundment). Some activities, such as facility decontamination, may be performed at one time for both units. In such situations, the user should take care to ensure that all relevant activities are addressed but are not double-counted.

CHAPTER 2

WASTE PILE

This chapter contains the worksheets for estimating Part 264 or Part 265 closure costs and contingent closure costs (Part 264 only) for waste piles. Applicable sections of Worksheets D-1 through D-5, D-9, and D-10 should be completed for all waste pile facilities. There may be no leachate quantity to include in Worksheet D-2, however, because a leachate collection system is not required (although the facility may have one). Groundwater monitoring is required at waste pile facilities under Part 264 regulations. Worksheet D-3 should be completed (for Part 264 or Part 265) if a groundwater monitoring program is in place at the time of closure. Worksheets D-6 and D-7 would be applicable if there is a contaminated foundation or pad and/or containment system to be removed, and Worksheet D-8 will be applicable if there is contaminated soil at the facility. If there is contaminated soil under the waste pile and not all of the contaminated soil can be removed, the pile must be closed as a landfill and the landfill closure cost worksheets should be used.

Under the Part 264 regulations, a contingent closure cost estimate must be prepared for a waste pile that does not meet Part 264 liner requirements and is not exempt from them. The contingency closure cost estimate must include the cost of complying with the contingent closure plan (i.e., closure as a landfill) but is not required to include the cost of the expected closure by removal. Consequently, only one closure cost estimate, the contingent cost estimate needs to be prepared. Applicable sections of Worksheets D-1 through D-15 should be completed for the contingent closure cost estimate.

The waste pile closure worksheets address the following items:

- Inventory Management

  1. Removing waste pile inventory (maximum)
  2. Containerization of bulk waste
  3. Container loading
  4. Off-site management of inventory
  5. On-site disposal

- Leachate and/or Run-Off Management

  1. Leachate and/or run-off collection
  2. On-site treatment of leachate/run-off
  3. Treated leachate/run-off discharge to sewer
  4. Off-site management of leachate/run-off and/or treatment residue
  5. Solidification prior to on-site landfill disposal
  6. On-site disposal
  7. Leachate collection system maintenance
  8. Leak detection system maintenance

- Groundwater Monitoring - Part 264 Only

  1. Detection monitoring - background/upgradient wells
  2. Detection monitoring - compliance point/downgradient wells
  3. Compliance monitoring - background/upgradient wells
  4. Compliance monitoring - for selected hazardous constituents at compliance point/downgradient wells
  5. Compliance monitoring - for Appendix VIII constituents at compliance point/downgradient wells
  6. Administrative (reporting)
  7. Monitoring well maintenance and replacement

- Groundwater Monitoring - Part 265 Only

  1. Groundwater quality analysis
  2. Groundwater contamination analysis
  3. Administrative (reporting)
  4. Monitoring well maintenance and replacement

- Testing for Soil Contamination

  1. Background samples and samples with potential contamination
  2. Preparation of isogram plan

- Decontamination

  1. Protective clothing and safety equipment for facility personnel
  2. Equipment decontamination
  3. Tank decontamination
  4. Pad or foundation decontamination
  5. Sump decontamination
  6. Container rinsing
  7. Other items needing decontamination
  8. On-site treatment of decontamination residues
  9. Testing for success of decontamination
  10. Treated residue discharge to sewer
  11. Off-site management of decontamination fluid/residue and/or treatment residue
  12. On-site disposal

- Foundation/Pad Removal

  1. Protective clothing
  2. Pad or foundation demolition
  3. Equipment decontamination
  4. On-site treatment of decontamination residues
  5. Treated residue discharge to sewer

6. Off-site management of rubble, decontamination residue, and/or treatment residue
7. On-site disposal

- Containment/Liner System Removal
    1. Protective clothing
    2. Containment/liner system excavation
    3. Equipment decontamination
    4. On-site treatment of decontamination residues
    5. Treated residue discharge to sewer
    6. Off-site management of rubble, decontamination residue, and/or treatment residue
    7. On-site disposal

- Removal of Contaminated Soil
    1. Protective clothing
    2. Excavation of contaminated soil and earthen berms
    3. Equipment decontamination
    4. On-site treatment of decontamination residues
    5. Treated residue discharge to sewer
    6. Off-site management of contaminated soil, decontamination residue, and/or treatment residue
    7. On-site disposal

- Certification of Partial Closures
    1. Independent registered professional engineer
    2. Clerical

- Certification of Final Closure

    1. Independent registered professional engineer
    2. Clerical

- Inspection and Repairs

    1. Inspection
    2. Fence installation or repair
    3. Other security equipment repair

- Final Cover

    1. Native soil for slope and fill
    2. On-site clay
    3. Off-site clay
    4. Synthetic membrane
    5. Sand
    6. Gravel
    7. Drainage tile
    8. Geotextile filter fabric
    9. Topsoil
    10 Crushed stone
    11. Mobilization/demobilization

- Revegetation

    1. Soil preparation and grading
    2. Seeding
    3. Fertilizing
    4. Mulching
    5. Mobilization/demobilization

- Survey Plat - Partial Closures
  1. Surveying of waste management area boundaries
  2. Fence posts to mark boundaries
  3. Plat submittal

- Survey Plat - Final Closure
  1. Surveying of waste management area boundaries
  2. Fence posts to mark boundaries
  3. Plat submittal

WORKSHEET D-1

Inventory Management

1. Removing Waste Pile Inventory (Maximum)
    - a. Maximum waste pile volume (yd^3) ______________
    - b. Moving/loading unit cost ($/$yd^3$) ______________(p. 4-7)
    - c. Mobilization/demobilization cost ($) ______________(p. 4-7)
    - d. Waste pile inventory removal cost ($) (Line 1a x Line 1b) + Line 1c ______________
2. Containerization of Bulk Waste
    - a. Quantity of waste to be containerized (gal) ______________*
    - b. Container capacity (gal/container) ______________(55 gal/container; p. 4-6)
    - c. Number of containers needed Line 2a ÷ Line 2b ______________
    - d. Containerization unit cost ($/container) ______________(pp. 4-6 and 4-8)
    - e. Containerization cost ($) Line 2c x Line 2d ______________
3. Container Loading
    - a. Number of pallets Line 2c ÷ 4 (round up to nearest integer) ______________
    - b. Loading unit cost ($/pallet) ______________($4.66/pallet; p. 4-8)
    - c. Container loading cost ($) Line 3a x Line 3b ______________

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* Conversion factors are provided in the Volume III appendix.

WORKSHEET D-1 (page 2)

4. Off-Site Management of Inventory

   a. Quantity to be managed off-site (tons) ______________*

   b. Off-site management method ______________________

   c. Transportation unit cost ($/mi) ______________ ($4.50/mi; p. 4-15)**

   d. One-way travel distance (mi/load) ______________

   e. Truck capacity (tons) ______________

   f. Number of loads
      Line 4a ÷ Line 4e
      (round up to nearest integer) ______________

   g. Transportation cost ($)
      Line 4c x Line 4d x Line 4f ______________

   h. Off-site management unit cost ($/ton) ______________ (pp. 4-13 - 4-20)

   i. Off-site management cost ($)
      Line 4g + (Line 4a x Line 4h) ______________

5. On-Site Disposal

   Include volume on one or more worksheets:
   Landfill Inventory - Line 1e
   Incinerator Inventory - Line 1c
   Land Treatment Inventory - Line 1a, Line 1c

6. Waste Pile Inventory Management Subtotal ($)
   Line 1d + Line 2e + Line 3c + Line 4i ☐

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* Conversion factors are provided in the Volume III appendix.

** Based on a 250-mile one-way distance.

WORKSHEET D-2

Leachate and/or Run-Off Management

1. Leachate and/or Run-Off Collection

   a. Leachate and/or run-off volume collected during closure (gal) ______________

   b. Time required for pumping (hrs) Line 1a ÷ 8000 (round up to nearest integer) ______________

   c. Pumping unit cost ($/hr) ______________ ($23/hr; p. 4-11)

   d. Pump rental cost, optional ($/hr) ______________ ($2.70/hr; p. 4-11)

   e. Pumping cost ($) Line 1b x (Line 1c + Line 1d) ______________

2. On-Site Treatment of Leachate/Run-Off

   a. Quantity of leachate/run-off to be treated (gal) ______________

   b. Chemicals required for treatment (lb/gal leachate/run-off or gal/gal leachate/run-off) ______________ (pp. 4-12 - 4-13)

   c. Chemicals unit cost ($/lb or $/gal) ______________

   d. Chemicals cost ($) Line 2a x Line 2b x Line 2c ______________

   e. Electricity required for treatment (kwh/gal leachate/run-off) ______________ (pp. 4-12 - 4-13)

   f. Electricity unit cost ($/kwh) ______________ ($0.05/kwh; p. 4-2)

   g. Electricity cost ($) Line 2a x Line 2e x Line 2f ______________

   h. Water required for treatment (gal/gal leachate/run-off) ______________ (pp. 4-12 - 4-13)

   i. Water unit cost ($/1000 gal) ______________ ($1.22/1000 gal; p. 4-2)

   j. Water cost ($) [(Line 2a x Line 2h) ÷ 1000] x Line 2i ______________

   k. Fuel required for treatment (MMBtu/gal leachate/run-off) ______________ (pp. 4-12 - 4-13)

WORKSHEET D-2 (page 2)

l. Fuel unit cost ($MMBtu) ______________ (p. 4-2)

m. Fuel cost ($)
Line 2a x Line 2k x Line 2l ______________

n. Labor required for treatment
(hrs/gallon leachate/run-off) ______________ (pp. 4-12 - 4-13)

o. Process operator unit labor
cost ($/hr) ______________ ($26.50/hr; p. 9-3)

p. Labor cost ($)
Line 2a x Line 2n x Line 2o ______________

q. On-site treatment cost ($)
Line 2d + Line 2g + Line 2j +
Line 2m + Line 2p ______________

r. Residue generated from treatment
(gal) ______________

3. Treated Leachate/Run-Off Discharge to Sewer

a. Quantity discharged (gal) ______________

b. Sewer discharge unit cost
($/1000 gal) ______________ ($1.50/1000 gal;
p. 4-2)

c. Sewer discharge cost ($)
(Line 3a ÷ 1000) x Line 3b ______________

4. Off-Site Management of Leachate/Run-Off
and/or Treatment Residue

a. Amount to be managed off-site (tons) ______________ *

b. Truck capacity (tons) ______________

c. Number of loads
Line 4a ÷ Line 4b
(round up to nearest integer) ______________

d. One-way distance (mi/load) ______________

e. Transportation unit cost ($/mi) ______________ ($4.50/mi; p. 4-15)**

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* Conversion factors are provided in the Volume III appendix.

** Based on a 250-mile one-way distance.

WORKSHEET D-2 (page 3)

f. Transportation cost ($)
Line 4c x Line 4d x Line 4e ______________

g. Off-site management unit cost
($/ton) ______________(pp. 4-13 - 4-20)

h. Off-site management cost ($)
Line 4a x Line 4g ______________

i. Off-site management subtotal ($)
Line 4f + Line 4h ______________

5. Solidification Prior to On-Site Landfill Disposal

a. Quantity to be solidified (tons) ______________*

b. Type of solidification material____________________

c. Solidification unit cost ($/ton) ______________(p. 4-11)

d. Solidification cost ($)
Line 5a x Line 5c ______________

e. Change in waste quantity
(factor $\geq$ 1) ______________(1.0; p. 4-11)

f. Final solidified wate
quantity (tons)
Line 5a x (1 + Line 5e) ______________

6. On-Site Disposal

Include volume on one or more worksheets:
Landfill Inventory - Line 1b, Line 1f, Line 1g, Line 1p
Incinerator Inventory - Line 1j, Line 1k, Line 1m, Line 1n
Land Treatment Inventory - Line 1h, Line 1m, Line 1n, Line 1o

7. Leachate Collection System Maintenance (if applicable)

a. Maintenance time required (hrs) ______________

b. Unit labor cost ($/hr) ______________($23/hr; p. 9-3)

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* Conversion factors are provided in the Volume III appendix.

WORKSHEET D-2 (page 4)

c. Maintenance labor cost ($)
Line 7a x Line 7b ______________

d. Number of pumps needing
replacement ______________

e. Pump unit cost ($/pump) ______________(p. 3-4)

f. Pump cost ($)
Line 7d x Line 7e ______________

g. Total maintenance cost ($)
Line 7c + Line 7f ______________

8. Leak Detection System Maintenance (if applicable)

a. Maintenance time required (hrs) ______________

b. Unit labor cost ($/hr) ______________($23/hr; p. 9-3)

c. Maintenance labor cost ($)
Line 8a x Line 8b ______________

d. Number of pumps needing
replacement ______________

e. Pump unit cost ($/pump) ______________(p. 3-4)

f. Pump cost ($)
Line 8d x Line 8e ______________

g. Total maintenance cost ($)
Line 8c + Line 8f ______________

9. Leachate and/or Run-Off Management
Subtotal ($)
Line 1e + Line 2q + Line 3c +
Line 4i + Line 5d + Line 7g +
Line 8g

WORKSHEET D-3, PART 264 ONLY

Groundwater Monitoring

1. Detection Monitoring - Background/Upgradient Wells (continuation of monitoring program from operating period)

   a. Number of wells ____________

   b. Number of samples collected per well (samples/well) ____________

   c. Number of replicate analyses per sample (replicates/sample) ____________

   d. Number of analyses Line 1a x Line 1b x Line 1c ____________(minimum of 4)

   e. Sample collection and preparation time required (hrs/well) ____________(4 hrs/well; p. 2-9)

   f. Transportation time to and from site (hrs) ____________

   g. Contract lab technician unit labor cost ($/hr) ____________($20.50/hr; p. 9-3)

   h. Sample collection time (hrs) (Line 1a x Line 1e) + Line 1f ____________

   i. Sampling cost ($) Line 1g x Line 1h ____________

   j. Contract lab fee ($/analysis) ____________(p. 2-10)

   k. Contract lab cost ($) Line 1d x Line 1j ____________

   l. Number of times upgradient detection monitoring samples are collected during closure ____________(quarterly for one year; p. 2-3)

   m. Upgradient/background detection monitoring cost ($) (Line 1i + Line 1k) x Line 1l ____________

WORKSHEET D-3, PART 264 ONLY (page 2)

2. Detection Monitoring - Compliance Point/Downgradient Wells (continuation of monitoring program from operating period)

   a. Number of wells ______________

   b. Number of samples collected per well (samples/well) ______________

   c. Number of replicate analyses per sample (replicates/sample) ______________

   d. Number of analyses Line 2a x Line 2b x Line 2c ______________

   e. Sample collection and preparation time required (hrs/well) ______________ (4 hrs/well; p. 2-9)

   f. Transportation time to and from site (hrs) ______________

   g. Contract lab technician unit labor cost ($/hr) ______________ ($20.50/hr; p. 9-3)

   h. Sample collection time (hrs) (Line 2a x Line 2e) + Line 2f ______________

   i. Sampling cost ($) Line 2g x Line 2h ______________

   j. Contract lab fee ($/analysis) ______________ (p. 2-10)

   k. Contract lab cost ($) Line 2d x Line 2j ______________

   l. Number of times downgradient detection monitoring samples are collected during closure ______________ (twice/year; p. 2-3)

   m. Downgradient/compliance point detection monitoring cost ($) (Line 2i + Line 2k) x Line 2l ______________

3. Compliance Monitoring - Background/ Upgradient Wells (continuation of monitoring program from operating period)

   a. Number of wells ______________

WORKSHEET D-3, PART 264 ONLY (page 3)

b. Number of samples collected per well (samples/well) ________

c. Number of replicate analyses per sample (replicates/sample) ________

d. Number of analyses Line 3a x Line 3b x Line 3c ________(minimum of 4)

e. Sample collection and preparation time required (hrs/well) ________(4 hrs/well; p. 2-9)

f. Transportation time to and from site (hrs) ________

g. Contract lab technician unit labor cost ($/hr) ________($20.50/hr; p. 9-3)

h. Sample collection time (hrs) (Line 3a x Line 3e) + Line 3f ________

i. Sampling cost ($) Line 3g x Line 3h ________

j. Contract lab fee ($/analysis) ________(p. 2-10)

k. Contract lab cost ($) Line 3d x Line 3j ________

l. Number of times upgradient compliance monitoring samples are collected during closure ________(quarterly for one year; p. 2-4)

m. Upgradient/background compliance monitoring cost ($) (Line 3i + Line 3k) x Line 3l ________

4. Compliance Monitoring - for Selected Hazardous Constituents at Compliance Point/Downgradient Wells (continuation of monitoring program from operating period)

a. Number of wells ________

b. Number of samples collected per well (samples/well) ________

c. Number of replicate analyses per sample (replicates/sample) ________

WORKSHEET D-3, PART 264 ONLY (page 4)

d. Number of analyses
Line 4a x Line 4b x Line 4c ______________

e. Sample collection and preparation time required (hrs/well) ______________ (4 hrs/well; p. 2-9)

f. Transportation time to and from site (hrs) ______________

g. Contract lab technician unit labor cost ($/hr) ______________ ($20.50/hr; p. 9-3)

h. Sample collection time (hrs)
(Line 4a x Line 4e) + Line 4f ______________

i. Sampling cost ($)
Line 4g x Line 4h ______________

j. Contract lab fee ($/analysis) ______________ (p. 2-10)

k. Contract lab cost ($)
Line 4d x Line 4j ______________

l. Number of times downgradient hazardous constituent compliance monitoring samples are collected during closure ______________ (quarterly; p. 2-4)

m. Downgradient hazardous constituent compliance monitoring cost ($)
(Line 4i + Line 4k) x Line 4l ______________

5. Compliance Monitoring - for Appendix VIII Constituents at Compliance Point/Downgradient Wells (continuation of monitoring program from operating period)

a. Number of wells ______________

b. Number of samples collected per well (samples/well) ______________

c. Number of replicate analyses per sample (replicates/sample) ______________

d. Number of analyses
Line 5a x Line 5b x Line 5c ______________

e. Sample collection and preparation time required (hrs/well) ______________ (4 hrs/well; p. 2-9)

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f. Transportation time to and from site (hrs) __________

g. Contract lab technician unit labor costs ($/hr) __________ ($20.50/hr; p. 9-3)

h. Sample collection time (hrs) (Line 5a x Line 5e) + Line 5f __________

i. Sampling cost ($) Line 5g x Line 5h __________

j. Contract lab fee ($/analysis) __________ (p. 2-10)

k. Contract lab cost ($) Line 5d x Line 5j __________

l. Number of times downgradient Appendix VIII compliance monitoring samples are collected during closure __________ (annually; p. 2-4)

m. Downgradient Appendix VIII constituents compliance monitoring cost ($) (Line 5i + Line 5k) x Line 4l __________

6. Administrative (Reporting)

a. Number of analyses
(Line 1d x Line 1l) +
(Line 2d x Line 2l) +
(Line 3d x Line 3l) +
(Line 4d x Line 4l) +
(Line 5d x Line 5l) __________

b. Contract lab technician time required (hrs/analysis) __________

c. Contract lab technician unit labor cost ($/hr) __________ ($20.50/hr; p. 9-3)

d. Technician cost ($) Line 6a x Line 6b x Line 6c __________

e. Clerical time required (hrs/analysis) __________

f. Clerical unit labor cost ($/hr) __________ ($18/hr; p. 9-3)

g. Clerical cost ($) Line 6a x Line 6e x Line 6f __________

h. Administration subtotal ($) Line 6d + Line 6g __________

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7. Monitoring Well Maintenance and Replacement

a. Total number of wells ______________

b. Maintenance time required (hrs/well) ______________

c. Unit labor cost ($/hr) ______________($23/hr; p. 9-3)

d. Monitoring well maintenance cost ($) Line 7a x Line 7b x Line 7c ______________

e. Number of wells needing replacement ______________

f. Existing monitoring well sealing unit cost ($/well) ______________($300/well; p. 3-5)*

g. New monitoring well construction unit cost ($/well) ______________($4125/well; p. 3-5)*

h. Mobilization/demobilization ($) ______________($150; p. 3-5)

i. Monitoring well replacement cost ($) [Line 7e x (Line 7f + Line 7g)] + Line 7h ______________

j. Number of pumps needing replacement ______________(p. 3-5)

k. Pump unit cost ($/pump) ______________

l. Pump cost ($) Line 7j x Line 7k ______________

m. Number of wells needing tubing replacement ______________

n. Length of tubing (ft/well) ______________

o. Tubing unit cost ($/ft) ______________(p. 3-5)

p. Tubing replacement cost ($) Line 7m x Line 7n x Line 7o ______________

q. Number of wells needing cap replacement ______________

r. Well cap unit cost ($/cap) ______________

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* Based on a depth of 100 vertical lineal feet.

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s. Well cap replacement cost ($)
Line 7q x Line 7r

t. Monitoring well maintenance and
replacement cost ($)
Line 7d + Line 7h + Line 7i +
Line 7l + Line 7p + Line 7s

8. Groundwater Monitoring Subtotal ($)
Line 1m + Line 2m + Line 3m +
Line 4m + Line 5m + Line 6h + Line 7t

WORKSHEET D-3, PART 265 ONLY

Groundwater Monitoring

1. Groundwater Quality Analysis
   a. Number of wells ______________(minimum of 4; p. 2-1)
   b. Number of samples collected per well (samples/well) ______________
   c. Number of replicate analyses per sample (replicates/sample) ______________
   d. Number of analyses Line 1a x Line 1b x Line 1c ______________
   e. Sample collection and preparation time required (hrs/well) ______________(4 hrs/well; p. 2-4)
   f. Transportation time to and from site (hrs) ______________
   g. Contract lab technician unit labor cost ($/hr) ______________($20.50/hr; p. 9-3)
   h. Sample collection time (hrs) (Line 1a x Line 1e) + Line 1f ______________
   i. Sampling cost ($) Line 1g x Line 1h ______________
   j. Contract lab fee ($/analysis) ______________($85/analysis; p. 2-5)
   k. Contract lab cost ($) Line 1d x Line 1j ______________
   l. Number of times groundwater quality samples are collected during closure ______________
   m. Groundwater quality sampling cost ($) (Line 1i + Line 1k) x Line 1l ______________

2. Groundwater Contamination Analysis
   a. Number of wells ______________(minimum of 4; p. 2-1)
   b. Number of samples collected per well (samples/well) ______________

WORKSHEET D-3, PART 265 ONLY (page 2)

c. Number of replicate analyses per sample (replicates/sample) ______________ (4 replicates/sample; p. 2-2)

d. Number of analyses Line 2a x Line 2b x Line 2c ______________

e. Sample collection and preparation time required (hrs/well) ______________ (4 hrs/well; p. 2-6)

f. Transportation time to and from site (hrs) ______________

g. Contract lab technician unit labor cost ($/hr) ______________ ($20.50/hr; p. 9-3)

h. Sample collection time (hrs) (Line 2a x Line 2e) + Line 2f ______________

i. Sampling cost ($) Line 2g x Line 2h ______________

j. Contract lab fee ($/analysis) ______________ ($120/analysis; p. 2-7)

k. Contract lab cost ($) Line 2d x Line 2j ______________

l. Number of times groundwater contamination samples are collected during closure ______________

m. Groundwater contamination sampling cost ($) (Line 2i + Line 2k) x Line 2l ______________

3. Administrative (Reporting)

a. Total number of analyses (Line 1d x Line 1l) + (Line 2d x Line 2l) ______________

b. Contract lab technician time required (hrs/analysis) ______________

c. Technician unit labor cost ($/hr) ______________ ($20.50/hr; p. 9-3)

d. Technician cost ($) Line 3a x Line 3b x Line 3c ______________

e. Clerical time required (hrs/set of analysis) ______________

WORKSHEET D-3, PART 265 ONLY (page 3)

f. Clerical unit labor cost ($/hr) __________ ($18/hr; p. 9-3)

g. Clerical cost ($)
Line 3a x Line 3e x Line 3f __________

h. Administration subtotal ($)
Line 3d + Line 3g __________

4. Monitoring Well Maintenance and Replacement

a. Total number of wells __________

b. Maintenance time required
(hrs/well) __________

c. Unit labor cost ($/hr) __________ ($23/hr; p. 9-3)

d. Monitoring well maintenance cost ($)
Line 4a x Line 4b x Line 4c __________

e. Number of wells needing replacement __________

f. Existing monitoring well sealing
unit cost ($/well) __________ ($300/well; p. 3-5)*

g. New monitoring well construction
unit cost ($/well) __________ ($4125/well; p. 3-5)*

h. Mobilization/demobilization ($) __________ ($150; p. 3-5)

i. Monitoring well replacement cost ($)
[Line 4e x (Line 4f + Line 4g)] +
Line 4h __________

j. Number of pumps needing replacement __________ (p. 3-5)

k. Pump unit cost ($/pump) __________

l. Pump cost ($)
Line 4j x Line 4k __________

m. Number of wells needing tubing
replacement __________

n. Length of tubing (ft/well) __________

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* Based on a depth of 100 vertical lineal feet.

WORKSHEET D-3, PART 265 ONLY (page 4)

o. Tubing unit cost ($/ft) ______________ (p. 3-5)

p. Tubing replacement cost ($)
Line 4m x Line 4n x Line 4o ______________

q. Number of wells needing cap replacement ______________

r. Well cap unit cost ($/cap) ______________

s. Well cap replacement cost ($)
Line 4q x Line 4r ______________

t. Monitoring well maintenance and replacement cost ($)
Line 4d + Line 4h + Line 4i +
Line 4l + Line 4p + Line 4s ______________

5. Groundwater Monitoring Subtotal ($)
Line 1m + Line 2m + Line 3h + Line 4t ☐

WORKSHEET D-4

Testing for Soil Contamination

1. Background Samples and Samples with Potential Contamination

   a. Number of soil samples to be taken ______________

   b. Number of samples requiring coring through concrete/asphalt foundations/pads ______________

   c. Thickness of foundation/pad (inches) ______________

   d. Unit cost for coring through/removing concrete/asphalt foundations/pads ($/sample) ______________ ($15/inch; p. 6-1)

   e. Sample collection time required (hrs/sample) ______________ (1 hr/sample; p. 2-12)

   f. Transportation time to and from site (hrs) ______________

   g. Contract lab technician unit labor cost ($/hr) ______________ ($20.50/hr; p. 9-3)

   h. Sample collection time (hrs)
   (Line 1a x Line 1e) + Line 1f ______________

   i. Sampling cost ($)
   (Line 1b x Line 1c x Line 1d
   (Line 1g x Line 1h) ______________

   j. Contract lab fee ($/sample) ______________ (p. 2-13)

   k. Contract lab cost ($)
   Line 1a x Line 1j ______________

   l. Sample cost ($)
   Line 1i + Line 1k ______________

2. Preparation of Isogram Plan

   a. Engineer time required (hrs) ______________

   b. Engineer unit labor cost ($/hr) ______________ ($45.50/hr; p. 9-3)

   c. Engineer cost ($)
   Line 2a x Line 2b ______________

   d. Draftsperson time required (hrs) ______________

   e. Draftsperson unit labor cost ($/hr) ______________ ($24/hr; p. 9-3)

WORKSHEET D-4 (page 2)

f. Draftsperson cost ($)
Line 2d x Line 2e ________

g. Clerical time required (hrs) ________

h. Clerical unit labor cost ($/hr) ________ ($18/hr; p. 9-3)

i. Clerical cost ($)
Line 2g x Line 2h ________

j. Isogram plan cost ($)
Line 2c + Line 2f + Line 2i ________

3. Soil Testing Subtotal ($)
Line 1l + Line 2j ☐

WORKSHEET D-5

Decontamination

1. Protective Clothing and Safety Equipment for Facility Personnel

   a. Number of personnel requiring protective clothing and safety equipment for decontamination ____________

   b. Safety equipment and protective clothing unit cost ($/person) ____________ ($80/person; p. 5-6)

   c. Safety equipment and protective clothing cost ($)
   Line 1a x Line 1b ____________

2. Equipment Decontamination

   a. Equipment needing decontamination:

      - pumps and feed lines
      - heavy equipment (e.g., fork lifts, dozers, etc.)
      - other equipment (list)________________________
      ____

   b. Number of pumps and lines ____________

   c. Pumps and lines decontamination cost ($) ____________(p. 5-4)

   d. Residual generation rate for pump and line decontamination ____________(50 gal/pump and line; p. 5-1)

   e. Residual generated from pump and line decontamination (gal)
   Line 2b x Line 2d ____________

   f. Heavy equipment decontamination cost ($) ____________(p. 5-2)

   g. Total heavy equipment decontamination time (hrs) ____________(p. 5-2)

   h. Residual generation rate for heavy equipment decontamination (gal/hr) ____________(100 gal/hr; p. 5-1)

WORKSHEET D-5 (page 2)

i. Residual generated from heavy equipment decontamination (gal)
Line 2g x Line 2h ______________

j. Equipment decontamination cost ($)
Line 2c + Line 2f ______________

k. Contaminated fluid and/or residues generated (gal)
Line 2e + Line 2i ______________

3. Tank Decontamination

a. Number of personnel entering tanks ______________

b. Additional personnel safety equipment unit cost ($/person) ______________($172/person; p. 5-6)

c. Additional personnel safety equipment cost ($)
Line 3a x Line 3b ______________

d. Method of tank decontamination ____________________

e. Tank area to be decontaminated (ft^2) ______________

f. Tank decontamination unit cost ($\$/ft^2$) ______________(p. 5-3)

g. Tank decontamination cost ($)
Line 3e x Line 3f ______________

h. Tank decontamination subtotal before surcharge ($)
Line 3c + Line 3g ______________

i. Surcharge factor (factor ≥1) ______________(2.0; p. 5-6)

j. Tank decontamination subtotal ($)
Line 3h x (1 + Line 3i) ______________

k. Volume of tank(s) to be filled with sand (gal) ______________

WORKSHEET D-5 (page 3)

l. Sand purchase and placement unit cost ($/gal) ____________ ($0.10/gal; p. 5-7)

m. Tank decontamination and sand filling cost ($)
Line 3j + (Line 3k x Line 3l) ____________

n. Residual generation rate for tank decontamination (gal/ft^2) ____________ (p. 5-3)

o. Contaminated fluid and/or residues generated (gal)
Line 3e x Line 3n ____________

4. Pad or Foundation Decontamination

a. Method of pad decontamination ____________

b. Pad area to be decontaminated (ft^2) ____________

c. Pad decontamination unit cost ($/ft^2) ____________ (p. 5-3)

d. Pad decontamination subtotal ($)
Line 4b x Line 4c ____________

e. Residual generation rate for pad/foundation decontamination (gal/ft^2) ____________ (p. 5-3)

f. Contaminated fluid and/or residues generated (gal)
Line 4b x Line 4e ____________

5. Sump Decontamination

a. Method of sump decontamination ____________

b. Volume to be pumped from sump(s) (gal) ____________

c. Time required for pumping (hrs)
Line 5b ÷ 8000
(round up to nearest integer) ____________

d. Pumping unit cost ($/hr) ____________ ($23/hr; p. 4-11)

WORKSHEET D-5 (page 4)

e. Pump rental cost, optional ($/hr) __________ ($2.70/hr; p. 4-11)

f. Pumping cost ($) (Line 5c x Line 5d) + Line 5e __________

g. Sump area to be decontaminated (ft^2) __________

h. Sump decontamination unit cost ($/ft^2) __________ (p. 5-3)

i. Sump decontamination cost ($) Line 5g x Line 5h __________

j. Sump decontamination subtotal ($) Line 5f + Line 5i __________

k. Residual generation rate for sump decontamination (gal/ft^2) __________ (p. 5-3)

l. Contaminated fluid and/or residues generated (gal) Line 5b + (Line 5g x Line 5k) __________

6. Container Rinsing

a. Number of containers __________

b. Container rinsing time required (hrs) 0.083 x Line 6a __________

c. Container rinsing unit cost ($/hr) __________ ($32.75/hr; p. 5-10)

d. Container rinsing subtotal ($) Line 6b x Line 6c __________

e. Residual generation rate for container rinsing (gal/drum) __________ (10 gal/drum; p. 5-10)

f. Contaminated fluid/residual generated (gal) Line 6a x Line 6e __________

7. Other Items Needing Decontamination

a. List items __________

____

WORKSHEET D-5 (page 5)

b. Method of decontamination for other items ______________________________

c. Surface area of other items to be decontaminated (ft^2) ______________

d. Decontamination unit cost ($/ft^2) ______________ (p. 5-3)

e. Decontamination of other items subtotal ($)
Line 7c x Line 7d ______________

f. Residual generation rate for decontamination of other items (gal/ft^2) ______________ (p. 5-3)

g. Contaminated fluid and/or residues generated (gal)
Line 7c x Line 7f ______________

8. On-Site Treatment of Decontamination Residues

a. Quantity of residue to be treated (gal) ______________

b. Chemicals required for treatment (lb/gal residue or gal/gal residue) ______________ (pp. 4-12 - 4-13)

c. Chemicals unit cost ($/lb or $/gal) ______________

d. Chemicals cost ($)
Line 8a x Line 8b x Line 8c ______________

e. Electricity required for treatment (kwh/gal residue) ______________ (pp. 4-12 - 4-13)

f. Electricity unit cost ($/kwh) ______________ ($0.05/kwh; p. 4-2)

g. Electricity cost ($)
Line 8a x Line 8e x Line 8f ______________

h. Water required for treatment (gal/gal residue) ______________ (pp. 4-12 - 4-13)

i. Water unit cost ($/1000 gal) ______________ ($1.22/1000 gal; p. 4-2)

j. Water cost ($)
[(Line 8a x Line 8h) ÷ 1000] x Line 8i ______________

WORKSHEET D-5 (page 6)

k. Fuel required for treatment
(MMBtu/gal residue) ______________ (pp. 4-12 - 4-13)

l. Fuel unit cost ($/MMBtu) ______________ (p. 4-2)

m. Fuel cost ($)
Line 8a x Line 8k x Line 8l ______________

n. Labor required for treatment
(hrs/gallon residue) ______________ (pp. 4-12 - 4-13)

o. Process operator unit labor cost
($/hr) ______________ ($26.50/hr; p. 9-3)

p. Labor cost ($)
Line 8a x Line 8n x Line 8o ______________

q. On-site treatment cost ($)
Line 8d + Line 8g + Line 8j +
Line 8m + Line 8p ______________

r. Residue generated from treatment
(gal) ______________

9. Testing for Success of Decontamination

a. Number of Samples ______________

b. Sample collection time required
(hrs/sample) ______________

c. Technician unit labor cost ($/hr) ______________ ($20-50/hr; p. 9-3)

d. Sample collection time (hrs)
Line 9a x Line 9b ______________

e. Sampling cost ($)
Line 9c x Line 9d ______________

f. Cost to test each sample
($/sample) ______________ (pp. 5-10 - 5-11)

g. Testing cost ($)
Line 9a x Line 9f ______________

h. Testing for success of
decontamination cost ($)
Line 9e + Line 9g ______________

WORKSHEET D-5 (page 7)

10. Treated Residue Discharge to Sewer

a. Volume of liquid discharged (gal) ____________

b. Sewer discharge unit cost ($/1000 gal) ____________ ($1.50/1000 gal; p. 4-2)

c. Sewer discharge cost ($) (Line 10a ÷ 1000) x Line 10b ____________

11. Off-Site Management of Decontamination Fluid/Residues and/or Treatment Residue

a. Off-site management method ____________________

b. Quantity to be managed off-site (tons) ____________*

c. Truck capacity (tons) ____________

d. Number of loads Line 11b ÷ Line 11c (round up to nearest integer) ____________

e. One-way distance (mi/load) ____________

f. Transportation unit cost ($/mi) ____________ ($4.50/mi; p. 4-15)**

g. Transportation cost ($) Line 11d x Line 11e x Line 11f ____________

h. Off-site management unit cost ($/ton) ____________ (pp. 4-13 - 4-20)

i. Off-site management cost ($) Line 11b x Line 11h ____________

j. Contaminated fluid and residue disposal subtotal ($) Line 11g + Line 11i ____________

12. On-Site Disposal

Include volume on one or more worksheets:
    Landfill Inventory - Line 1n, Line 1p
    Incinerator Inventory - Line 1l, Line 1n
    Land Treatment Inventory - Line 1k, Line 1o

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* Conversion factors are provided in the Volume III appendix.

** Based on a 250-mile one-way distance.

WORKSHEET D-5 (page 8)

13. Facility Decontamination Subtotal ($)
Line 1c + Line 2j + Line 3m + Line 4d +
Line 5j + Line 6d + Line 7e + Line 8q +
Line 9h + Line 10c + Line 11j ☐

WORKSHEET D-6

Foundation/Pad Removal

1. Protective Clothing

   a. Number of personnel requiring protective clothing for demolition __________

   b. Protective clothing unit cost ($/person) __________($77/person; p. 6-8)

   c. Protective clothing cost ($) Line 1a x Line 1b __________

2. Pad or Foundation Demolition

   a. Volume of pad/foundation to be demolished (yd^3) __________

   b. Demoliton unit cost ($/yd^3) __________($82/yd^3; p. 6-1)

   c. Pad/foundation loading unit cost ($/yd^3) __________(p. 4-7)

   d. Demolition and loading cost ($) Line 2a x (Line 2b + Line 2c) __________

   e. Mobilization/demolition cost ($) __________(p. 4-7)

   f. Pad/foundation demolition and loading cost before surcharge ($) Line 2d + Line 2e __________

   g. Surcharge factor __________(1.0; pp. 6-8 - 6-9)

   h. Foundation demolition cost ($) Line 2f x (1 + Line 2g) __________

3. Equipment Decontamination

   a. Total heavy equipment decontamination time (hrs) __________(p. 5-2)

   b. Heavy equipment decontamination cost ($) __________ (p. 5-2)

   c. Residual generation rate for heavy equipment decontamination (gal/hr) __________(100 gal/hr; p. 5-1)

   d. Contaminated fluid and/or residue generated (gal) Line 3a x Line 3c __________

WORKSHEET D-6 (page 2)

4. On-Site Treatment of Decontamination Residues

   a. Quantity of residue to be treated (gal) ______________

   b. Chemicals required for treatment (lb/gal residue or gal/gal residue) ______________ (pp. 4-12 - 4-13)

   c. Chemicals unit cost ($/lb or $/gal) ______________

   d. Chemicals cost ($) Line 4a x Line 4b x Line 4c ______________

   e. Electricity required for treatment (kwh/gal residue) ______________ (pp. 4-12 - 4-13)

   f. Electricity unit cost ($/kwh) ______________ ($0.05/kwh; p. 4-2)

   g. Electricity cost ($) Line 4a x Line 4e x Line 4f ______________

   h. Water required for treatment (gal/gal residue) ______________ (pp. 4-12 - 4-13)

   i. Water unit cost ($/1000 gal) ______________ ($1.22/1000 gal; 4-2)

   j. Water cost ($) [(Line 4a x Line 4h) ÷ 1000] x Line 4i ______________

   k. Fuel required for treatment (MMBtu/gal residue) ______________ (pp. 4-12 - 4-13)

   l. Fuel unit cost ($/MMBtu) ______________ (p. 4-2)

   m. Fuel cost ($) Line 4a x Line 4k x Line 4l ______________

   n. Labor required for treatment (hrs/gallon residue) ______________ (pp. 4-12 - 4-13)

   o. Process operator unit labor cost ($/hr) ______________ ($26.50/hr; p. 9-3)

   p. Labor cost ($) Line 4a x Line 4n x Line 4o ______________

   q. On-site treatment cost ($) Line 4d + Line 4g + Line 4j + Line 4m + Line 4p ______________

   r. Residue generated from treatment (gal) ______________

WORKSHEET D-6 (page 3)

5. Treated Residue Discharge to Sewer

   a. Volume of liquid discharged (gal) ________

   b. Sewer discharge unit cost ($/1000 gal) ________ ($1.50/1000 gal; p. 4-2)

   c. Sewer discharge cost ($) (Line 5a ÷ 1000) x Line 5b ________

6. Off-Site Management of Rubble, Decontamination Residue, and/or Treatment Residue

   a. Volume to be managed off-site (tons) ________*

   b. Truck capacity (tons) ________

   c. Number of loads Line 6a ÷ Line 6b (round up to nearest integer) ________

   d. Transportation unit cost ($/mi) ________ ($4.50/mi; p. 4-15)**

   e. One-way distance (mi/load) ________

   f. Transportation cost ($) Line 6c x Line 6d x Line 6e ________

   g. Off-site management unit cost ($/ton) ________ (pp. 4-13 - 4-20)

   h. Off-site management cost ($) Line 6a x Line 6g ________

   i. Off-site management subtotal ($) Line 6f + Line 6i ________

7. On-Site Disposal

   Include volume on one or more worksheets:
      Landfill Inventory - Line 1m, Line 1n, Line 1p
      Incinerator Inventory - Line 1l, Line 1n
      Land Treatment Inventory - Line 1k, Line 1o

8. Demolition and Removal Subtotal ($) Line 1c + Line 2h + Line 3b + Line 4q + Line 5c + Line 6i ☐

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* Conversion factors are provided in the Volume III appendix.

** Based on a 250-mile one-way distance.

WORKSHEET D-7

Containment/Liner System Removal

1. Protective Clothing

   a. Number of personnel requiring protective clothing for excavation ________

   b. Protective clothing unit cost ($/person) ________ ($77/person; p. 6-8)

   c. Protective clothing cost ($) Line 1a x Line 1b ________

2. Containment/Liner System Excavation

   a. Volume of containment system, including earthen berms, to be removed (yd^3) ________

   b. Excavation unit cost, including loading ($\$/yd^3$) ________ (pp. 6-3 - 6-7)

   c. Containment system/berm removal cost ($) Line 2a x Line 2b ________

   d. Mobilization/demobilization cost ($) ________ (pp. 4-5, 4-7, 4-10, and 6-8)

   e. Containment system/berm excavation cost before surcharge ($) Line 2c + Line 2d ________

   f. Surcharge factor ________ (1.0; pp. 6-8 - 6-9)

   g. Containment/liner system/berm excavation cost ($) Line 2e x (1 + Line 2f) ________

3. Equipment Decontamination

   a. Total heavy equipment decontamination time (hrs) ________ (p. 5-2)

   b. Heavy equipment decontamination cost ($) ________ (p. 5-2)

   c. Residual generation rate for heavy equipment decontamination (gal/hr) ________ (100 gal/hr; p. 5-1)

   d. Contaminated fluid and/or residue generated (gal) Line 3a x Line 3c ________

WORKSHEET D-7 (page 2)

4. On-Site Treatment of Decontamination Residues

   a. Quantity of residue to be treated (gal) __________

   b. Chemicals required for treatment (lb/gal residue or gal/gal residue) __________ (pp. 4-12 - 4-13)

   c. Chemicals unit cost ($/lb or $/gal) __________

   d. Chemicals cost ($) Line 4a x Line 4b x Line 4c __________

   e. Electricity required for treatment (kwh/gal residue) __________ (pp. 4-12 - 4-13)

   f. Electricity unit cost ($/kwh) __________ ($0.05/kwh; p. 4-2)

   g. Electricity cost ($) Line 4a x Line 4e x Line 4f __________

   h. Water required for treatment (gal/gal residue) __________ (pp. 4-12 - 4-13)

   i. Water unit cost ($/1000 gal) __________ ($1.22/1000 gal; p. 4-2)

   j. Water cost ($) [(Line 4a x Line 4h) ÷ 1000] x Line 4i __________

   k. Fuel required for treatment (MMBtu/gal residue) __________ (pp. 4-12 - 4-13)

   l. Fuel unit cost ($/MMBtu) __________ (p. 4-2)

   m. Fuel cost ($) Line 4a x Line 4k x Line 4l __________

   n. Labor required for treatment (hrs/gallon residue) __________ (pp. 4-12 - 4-13)

   o. Process operator unit labor cost ($/hr) __________ ($26.50/hr; p. 9-3)

   p. Labor cost ($) Line 4a x Line 4n x Line 4o __________

   q. On-site treatment cost ($) Line 4d + Line 4g + Line 4j + Line 4m + Line 4p __________

   r. Residue generated from treatment (gal) __________

WORKSHEET D-7 (page 3)

5. Treated Residue Discharge to Sewer

   a. Volume of liquid discharged (gal) ______________

   b. Sewer discharge unit cost ($/1000 gal) ______________ ($1.50/1000 gal; p. 4-2)

   c. Sewer discharge cost ($) (Line 5a ÷ 1000) x Line 5b ______________

6. Off-Site Management of Rubble, Decontamination Residue, and/or Treatment Residue

   a. Volume to be managed off-site (tons) ______________*

   b. Truck capacity (tons) ______________

   c. Number of loads Line 6a ÷ Line 6b (round up to nearest integer) ______________

   d. Transportation unit cost ($/mi) ______________ ($4.50/mi; p. 4-15)**

   e. One-way distance (mi/load) ______________

   f. Transportation cost ($) Line 6c x Line 6d x Line 6e ______________

   g. Off-site management unit cost ($/ton) ______________ (pp. 4-13 - 4-20)

   h. Off-site management cost ($) Line 6a x Line 6g ______________

   i. Off-site management subtotal ($) Line 6f + Line 6h ______________

7. On-Site Disposal

   Include volume on one or more worksheets:
   Landfill Inventory - Line 1m, Line 1n, Line 1p
   Incinerator Inventory - Line 1l, Line 1n
   Land Treatment Inventory - Line 1k, Line 1o

8. Containment/Liner System Removal Subtotal ($) Line 1c + Line 2g + Line 3b + Line 4q + Line 5c + Line 6i ☐

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* Conversion factors are provided in the Volume III appendix.

** Based on a 250-mile one-way distance.

WORKSHEET D-8

Removal of Contaminated Soil

1. Protective Clothing
   - a. Number of personnel requiring protective clothing for excavation and decontaminating __________
   - b. Protective clothing unit cost ($/person) __________ ($77/person; p. 6-8)
   - c. Protective clothing cost ($) Line 1a x Line 1b __________
2. Excavation of Contaminated Soil and Earthen Berms
   - a. Volume of contaminated soil/berms to be removed (yd^3) __________
   - b. Excavation unit cost, including loading ($/yd^3) __________ (pp. 6-3 - 6-7)
   - c. Mobilization/demobilization cost ($) __________ (pp. 4-5, 4-7, 4-10, and 6-3)
   - d. Contaminated soil/berm removal cost before surcharge ($) (Line 2a x Line 2b) + Line 2c __________
   - e. Surcharge factor __________ (1.0; pp. 6-8 - 6-9)
   - f. Contaminated soil/berm removal subtotal ($) Line 2d x (1 + Line 2e) __________
3. Equipment Decontamination
   - a. Total heavy equipment decontamination time (hrs) __________ (p. 5-2)
   - b. Heavy equipment decontamination cost ($) __________ (p. 5-2)
   - c. Residual generation rate for heavy equipment decontamination (gal/hr) __________ (100 gal/hr; p. 5-1)
   - d. Contaminated fluid and/or residues generated (gal) Line 3a x Line 3c __________

WORKSHEET D-8 (page 2)

4. On-Site Treatment of Decontamination Residues

   a. Quantity of residue to be treated (gal) ______________

   b. Chemicals required for treatment (lb/gal residue or gal/gal residue) ______________ (pp. 4-12 - 4-13)

   c. Chemicals unit cost ($/lb or $/gal) ______________

   d. Chemicals cost ($) Line 4a x Line 4b x Line 4c ______________

   e. Electricity required for treatment (kwh/gal residue) ______________ (pp. 4-12 - 4-13)

   f. Electricity unit cost ($/kwh) ______________ ($0.05/kwh; p. 4-2)

   g. Electricity cost ($) Line 4a x Line 4e x Line 4f ______________

   h. Water required for treatment (gal/gal residue) ______________ (pp. 4-12 - 4-13)

   i. Water unit cost ($/1000 gal) ______________ ($1.22/1000 gal; p. 4-2)

   j. Water cost ($) [(Line 4a x Line 4h) ÷ 1000] x Line 4i ______________

   k. Fuel required for treatment (MMBtu/gal residue) ______________ (pp. 4-12 - 4-13)

   l. Fuel unit cost ($/MMBtu) ______________ (p. 4-2)

   m. Fuel cost ($) Line 4a x Line 4k x Line 4l ______________

   n. Labor required for treatment (hrs/gallon residue) ______________ (pp. 4-12 - 4-13)

   o. Process operator unit labor cost ($/hr) ______________ ($26.50/hr; p. 9-3)

   p. Labor cost ($) Line 4a x Line 4n x Line 4o ______________

WORKSHEET D-8 (page 3)

q. On-site treatment cost ($)
Line 4d + Line 4g + Line 4j +
Line 4m + Line 4p __________

r. Residue generated from treatment
(gal) __________

5. Treated Residue Discharge to Sewer

a. Volume of liquid discharged (gal) __________

b. Sewer discharge unit cost
($/1000 gal) __________ ($1.50/1000 gal; p. 4-2)

c. Sewer discharge cost ($)
(Line 5a ÷ 1000) x Line 5b __________

6. Off-Site Management of Contaminated Soil, Decontamination Residue, and/or Treatment Residue

a. Quantity to be managed off-site
(tons) __________

b. Truck capacity (tons) __________

c. Number of loads
Line 6a ÷ Line 6b
(round up to nearest integer) __________

d. One-way distance (mi/load) __________

e. Transportation unit cost ($/mi) __________ ($4.50/mi; p. 4-15)**

f. Transportation cost ($)
Line 6c x Line 6d x Line 6e __________

g. Off-site management unit
cost ($/ton) __________ (pp. 4-13 - 4-20)

h. Off-site management cost ($)
Line 6a x Line 6g __________

i. Off-site management subtotal ($)
Line 6f + Line 6h __________

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* Conversion factors are provided in the Volume III appendix.

** Based on a 250-mile one-way distance.

WORKSHEET D-8 (page 4)

7. On-Site Disposal

Include volume on one or more worksheets:
    Landfill Inventory - Line 1n, Line 1o, Line 1p
    Incinerator Inventory - Line 1l, Line 1n, Line 1o
    Land Treatment Inventory - Line 1k, Line 1l, Line 1o

8. Contaminated Soil Removal Subtotal ($)
Line 1c + Line 2f + Line 3b + Line 4q +
Line 5c + Line 6i

WORKSHEET D-9

Certification of Partial Closures (if Applicable)

1. Independent Registered Professional Engineer

   a. Initial review of closure plan (hrs) ____________ (4 hrs; p. 8-4)

   b. Total number of inspections for all partial closures ____________

   c. Inspection time required (hrs/inspection) ____________ (p. 8-3)

   d. Inspection time required (hrs) Line 1b x Line 1c ____________

   e. Prepare final documentation (hrs) ____________ (4 hrs; p. 8-4)

   f. Total professional engineer time required (hrs) Line 1a + Line 1d + Line 1e ____________

   g. Professional engineer unit labor cost ($/hr) ____________ ($45.50/hr; p. 8-3)

   h. Professional engineer cost ($) Line 1f x Line 1g ____________

2. Clerical*

   a. Number of weeks for all partial closures ____________

   b. Clerical time required (hrs/wk) ____________ (2 hrs/wk; p. 8-3)

   c. Clerical unit labor cost ($/hr) ____________ ($18/hr; p. 8-3)

   d. Clerical cost ($) Line 2a x Line 2b x Line 2c ____________

3. Certification of Partial Closures Subtotal ($) Line 1h + Line 2d ☐

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* Clerical time should be included only if the Professional Engineer is operating independently in a single-person business.

WORKSHEET D-10

Certification of Final Closure

1. Independent Registered Professional Engineer
    - a. Initial review of closure plan (hrs) __________ (8 hrs; p. 8-4)
    - b. Inspection frequency (inspections/wk) __________ (p. 8-3)
    - c. Inspection time required (hrs/inspection) __________ (p. 8-3)
    - d. Number of weeks for closure (wks) __________
    - e. Inspection time required (hrs) Line 1b x Line 1c x Line 1d __________
    - f. Prepare final documentation (hrs) __________ (4 hrs; p. 8-4)
    - g. Total professional engineer time required (hrs) Line 1a + Line 1e + Line 1f __________
    - h. Professional engineer unit labor cost ($/hr) __________ ($45.50/hr; p. 8-3)
    - i. Professional engineer cost ($) Line 1g x Line 1h __________

2. Clerical*
    - a. Clerical time required (hrs/wk) __________ (2 hrs/wk; p. 8-3)
    - b. Clerical unit labor cost ($/hr) __________ ($18/hr; p. 8-3)
    - c. Clerical cost ($) Line 1d x Line 2a x Line 2b __________

3. Certification of Closure Subtotal ($) Line 1i + Line 2c

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* Clerical time should be included only if the Professional Engineer is operating independently in a single-person business.

WORKSHEET D-11

Inspection and Repairs

1. Inspection

    a. Time required for inspection by technician (hrs) ________

    b. Technician unit labor cost ($/hr) ________ ($20.50/hr; p. 9-3)

    c. Technician cost ($) Line 1a x Line 1b ________

    d. Engineer time required (hrs) ________

    e. Engineer unit labor cost ($/hr) ________ ($45.50/hr; p. 9-3)

    f. Engineer cost ($) Line 1d x Line 1e ________

    g. Clerical time required (hrs) ________

    h. Clerical unit labor cost ($/hr) ________ ($18/hr; p. 9-3)

    i. Clerical cost ($) Line 1g x Line 1h ________

    j. Inspection subtotal ($) Line 1c + Line 1f + Line 1i ________

2. Fence Installation or Repair

    a. Amount of fence to be installed or replaced (L.F.) ________

    b. Fencing unit cost ($/L.F.) ________ ($10.55/L.F.; p. 3-8)

    c. Fence cost ($) Line 2a x Line 2b ________

    d. Number of gates needed ________

    e. Gate unit cost ($/gate) ________ ($80/gate; p. 3-8)

    f. Gate cost ($) Line 2d x Line 2e ________

    g. Number of fence posts needed ________

    h. Fence post unit cost ($/post) ________ ($57/post; p. 3-8)

WORKSHEET D-11 (page 2)

i. Fence post cost ($)
Line 2g x Line 2h ______________

j. Fence installation/repair cost ($)
Line 2c + Line 2f + Line 2i ______________

3. Other Security Equipment Repair

a. Types of equipment needing repair or replacement ______________________________

b. Number of items needing replacement ______________

c. Replacement unit cost ($/item) ______________ (p. 3-8)

d. Security equipment replacement cost ($)
Line 3b x Line 3c ______________

4. Inspection and Repairs Subtotal ($)
Line 1j + Line 2j + Line 3d ☐

WORKSHEET D-12

Final Cover

1. Native Soil for Slope and Fill

   a. Length of area to be capped (yd) ______________

   b. Width of area to be capped (yd) ______________

   c. Quantity needed (yd^3) ______________(*)

   d. Excavation unit cost (\$/yd^3) ______________

   e. Placement and spreading unit cost (\$/yd^3) ______________(\$2.48/yd^3; p. 7-6)

   f. Compaction unit cost (\$/yd^3) ______________(\$2.25/yd^3; p. 7-6)

   g. Total native soil unit cost (\$/yd^3) Line 1d + Line 1e + Line 1f ______________(\$1.04/yd^3; p. 7-6)

   h. Percent compaction (decimal < 1) ______________(0.25; p. 7-10)

   i. Native soil cost (\$) Line 1c x Line 1g x (1 + Line 1h) ____________________

2. On-Site Clay

   a. Area to be capped (yd^2) Line 1a x Line 1b ______________

   b. Depth of clay needed (yd) ______________

   c. Quantity needed (yd^3) Line 2a x Line 2b ______________

   d. Excavation unit cost (\$/yd^3) ______________(\$4.05/yd^3; p. 7-10)

   e. Placement/spreading unit cost (\$/yd^3) ______________(\$2.25/yd^3; p. 7-10)

   f. Compaction unit cost (\$/yd^3) ______________(\$2.41/yd^3; p. 7-10)

   g. Total on-site clay unit cost (\$/yd^3) Line 2d + Line 2e + Line 2f ______________(\$8.71/yd^3; pp. 7-10 - 7-11)

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* Formula provided in Final Cover and Revegetation chapter of Volume III.

WORKSHEET D-12 (page 2)

h. Percent compaction (decimal < 1) __________ (0.25; p. 7-10)

i. Clay lift thickness (yd) __________ (0.22 yd; p. 7-12)

j. Number of lifts
Line 2b ÷ Line 2i __________

k. Number of samples to be
tested/lift (samples/lift) __________ (3 samples/lift;
p. 7-12)

l. Number of samples to
be tested
Line 2j x Line 2k __________

m. Clay testing unit cost
(\$/sample) __________ (\$230/sample;
p. 7-12)

n. Clay testing cost
Line 2l x Line 2m __________

o. On-site clay cost (\$)
Line 2c x Line 2g x (1 + Line 2h)
+ Line 2n __________

3. Off-Site Clay

a. Area to be capped (yd^2)
Line 1a x Line 1b __________

b. Depth of clay needed (yd) __________ (0.67 yd; p. 7-4)

c. Quantity needed (yd^3)
Line 3a x Line 3b __________

d. Purchase unit cost (\$/yd^3) __________ (\$4.75/yd^3; p. 7-13)

e. Delivery unit cost (\$/yd^3) __________ (\$10.16/yd^3; p. 7-13)

f. Spreading unit cost (\$/yd^3) __________ (\$1.03/yd^3; p. 7-13)

g. Compaction unit cost (\$/yd^3) __________ (\$2.41/yd^3; p. 7-13)

h. Total off-site clay unit cost
(\$/yd^3)
Line 3d + Line 3e + Line 3f
+ Line 3g __________ (\$18.35/yd^3; pp. 7-13 -
7-14)

i. Percent compaction (decimal < 1) __________ (0.40; p. 7-10)

j. Clay lift thickness (yd) __________ (0.22 yd; p. 7-12)

WORKSHEET D-12 (page 3)

k. Number of lifts
Line 3b ÷ Line 3j ________

l. Number of samples to be
tested/lift (samples/lift) ________(3 samples/lift;
p. 7-12)

m. Number of samples to
be tested
Line 3k x Line 3l ________

n. Clay testing unit cost
($/sample) ________($230/sample;
p. 7-12)

o. Clay testing cost
Line 3m x Line 3n ________

p. Off-site clay cost ($)
Line 3c x Line 3h x (1 + Line 3i)
+ Line 3o ________

4. Synthetic Membrane

a. Type of membrane ________________

b. Quantity needed (yd^2) ________

c. Purchase unit cost ($/yd^2) ________($2.60/yd^2; p. 7-16)

d. Delivery unit cost ($/yd^2) ________($0.25/yd^2; p. 7-16)

e. Installation unit cost ($/yd^2) ________($0.50/yd^2; p. 7-16)

f. Total synthetic membrane
unit cost ($/yd^2)
Line 4c + Line 4d + Line 4e ________($3.35/yd^2; p. 7-16)

g. Synthetic liner testing
(percent of total synthetic
membrane unit cost) ________(0.25; p. 7-15)

h. Synthetic membrane cost ($)
Line 4b x Line 4f x (1 +
Line 4g) ________

5. Sand

a. Area to be capped (yd^2)
Line 1a x Line 1b ________

b. Depth of sand needed (yd) ________(0.33 yd; p. 7-4)

WORKSHEET D-12 (page 4)

c. Quantity needed (yd^3)
Line 5a x Line 5b ______________

d. Purchase unit cost ($/$yd^3$) ______________($5.50/yd^3; p. 7-20)

e. Delivery unit cost ($/$yd^3$) ______________($2.61/yd^3; p. 7-20)

f. Spreading unit cost ($/$yd^3$) ______________($1.03/yd^3; p. 7-20)

g. Compaction unit cost ($/$yd^3$) ______________($1.49/yd^3; p. 7-20)

h. Total sand unit cost ($/$yd^3$)
Line 5d + Line 5e + Line 5f
+ Line 5g ______________($10.63/$yd^3$; pp. 7-20 - 7-21)

i. Percent compaction (decimal < 1) ______________(0.10; p. 7-10)

j. Sand cost ($)
Line 5c x Line 5h x (1 + Line 5i) ______________

6. Gravel

a. Area to be capped (yd^2)
Line 1a x Line 1b ______________

b. Depth of gravel needed (yd) ______________(0.33 yd; p. 7-4)

c. Quantity needed (yd^3)
Line 6a x Line 6b ______________

d. Purchase unit cost ($/$yd^3$) ______________($3.85/yd^3; p. 7-17)

e. Delivery unit cost ($/$yd^3$) ______________($2.61/yd^3; p. 7-17)

f. Spreading unit cost ($/$yd^3$) ______________($1.03/yd^3; p. 7-17)

g. Compaction unit cost ($/$yd^3$) ______________($1.22/yd^3; p. 7-17)

h. Total gravel unit cost ($/$yd^3$)
Line 6d + Line 6e + Line 6f
+ Line 6g ______________($8.71/$yd^3$; pp. 7-17 - 7-18)

i. Percent compaction (decimal < 1) ______________(0.05; p. 7-10)

j. Gravel cost ($)
Line 6c x Line 6h x (1 + Line 6i) ______________

WORKSHEET D-12 (page 5)

7. Drainage Tile

    a. Type of tile ____________________
    b. Length needed (L.F.) ____________
    c. Tile unit cost ($/L.F.) ____________ ($0.50/L.F.; p. 7-22)
    d. Trenching and backfilling unit cost ($/L.F.) ____________ ($0.56/L.F.; p. 7-22)
    e. Total drainage tile unit cost ($/L.F.) Line 7c + Line 7d ____________ ($1.06/L.F.; pp. 7-22 - 7-23)
    f. Drainage tile cost ($) Line 7b x Line 7e ____________

8. Geotextile Filter Fabric

    a. Type of geotextile ____________________
    b. Quantity needed (yd^2) ____________
    c. Purchase unit cost ($/yd^2) ____________ ($0.69/yd^2; p. 7-24)
    d. Delivery unit cost ($/yd^2) ____________ ($0.05/yd^2; p. 7-24)
    e. Installation unit cost ($/yd^2) ____________ ($0.09/yd^2; p. 7-24)
    f. Total geotextile filter fabric unit cost ($/yd^2) Line 8c + Line 8d + Line 8e ____________ ($0.83/yd^2; p. 7-24)
    g. Geotextile filter fabric cost ($) Line 8b x Line 8f ____________

9. Topsoil

    a. Area to be capped (yd^2) Line 1a x Line 1b ____________
    b. Depth of topsoil needed (yd) ____________ (0.67 yd; p. 7-4)
    c. Quantity needed (yd^3) Line 9a x Line 9b ____________
    d. Purchase unit cost ($/yd^3) ____________ ($6.56/yd^3; p. 7-26)
    e. Delivery unit cost ($/yd^3) ____________ ($2.61/yd^3; p. 7-26)

WORKSHEET D-12 (page 6)

f. Spreading unit cost ($\$/\text{yd}^3$) ________ ($\$1.03/\text{yd}^3$; p. 7-26)

g. Compaction unit cost ($\$/\text{yd}^3$) ________ ($\$1.22/\text{yd}^3$; p. 7-26)

h. Total topsoil unit cost ($\$/\text{yd}^3$)
Line 9d + Line 9e + Line 9f +
Line 9g ________ ($\$11.42/\text{yd}^3$; p. 7-26 - 7-27)

i. Percent compaction (decimal < 1) ________ (0.25; p. 7-10)

j. Topsoil cost ($)
Line 9c x Line 9h x (1 + Line 9i) ________

10. Crushed Stone

a. Area to be capped (yd^2)
Line 1a x Line 1b ________

b. Depth of crushed stone needed (yd) ________ (0.33 yd; p. 7-4)

c. Quantity needed (yd^3)
Line 10a x Line 10b ________

d. Purchase unit cost ($\$/\text{yd}^3$) ________ ($\$11.55/\text{yd}^3$; p. 7-28)

e. Delivery unit cost ($\$/\text{yd}^3$) ________ ($\$2.61/\text{yd}^3$; p. 7-28)

f. Spreading unit cost ($\$/\text{yd}^3$) ________ ($\$1.03/\text{yd}^3$; p. 7-28)

g. Compaction unit cost ($\$/\text{yd}^3$) ________ ($\$1.22/\text{yd}^3$; p. 7-28)

h. Total crushed stone unit cost
($\$/\text{yd}^3$)
Line 10d + Line 10e + Line 10f
+ Line 10g ________ ($\$16.41/\text{yd}^3$; pp. 7-28 - 7-29)

i. Percent compaction (decimal < 1) ________ (0.05; p. 7-10)

j. Crushed stone cost ($)
Line 10c x Line 10h x (1 + Line 10i) ________

11. Mobilization/Demobilization

a. Heavy equipment mobilization/
demobilization cost ($) ________ ($700; p. 7-32)

12. Final Cover Subtotal ($)
Line 1i + Line 2o + Line 3p + Line 4h
+ Line 5j + Line 6j + Line 7f
+ Line 8g + Line 9j + Line 10j
+ Line 11a

WORKSHEET D-13

Revegetation

1. Soil Preparation and Grading

    a. Area to be revegetated, including closed area that needs replanting (acres) __________

    b. Soil preparation and grading unit cost ($/acre) __________ ($1002/acre; p. 7-31)

    c. Soil preparation and grading cost ($)
    Line 1a x Line 1b __________

2. Seeding

    a. Type of vegetation____________________

    b. Seed unit cost ($/acre) __________ ($795/acre; p. 7-31)

    c. Seed cost ($)
    Line 1a x Line 2b __________

3. Fertilizing

    a. Type of fertilizer____________________

    b. Fertilizer unit cost ($/acre) __________ ($176/acre; p. 7-31)

    c. Fertilizing cost ($)
    Line 1a x Line 3b __________

4. Mulching

    a. Mulch unit cost ($/acre) __________ ($1048/acre; p. 7-31)

    b. Mulching cost ($)
    Line 1a x Line 4a __________

5. Mobilization/Demobilization

    a. Heavy equipment mobilization/demobilization cost ($) __________ ($105; p. 7-32)

6. Revegetation Subtotal ($)
Line 1c + Line 2c + Line 3c + Line 4b + Line 5a ☐

WORKSHEET D-14

Survey Plat - Partial Closures

1. Surveying of Waste Management Area Boundaries
   a. Number of separate partial closures ____________
   b. Land surveying team time required (hrs/partial closure) ____________
   c. Land surveying team unit labor cost ($/hr) ____________ ($75/hr; p. 9-3)
   d. Land surveying cost ($) Line 1a x Line 1b x Line 1c ____________
2. Fence Posts to Mark Boundaries
   a. Number of fence posts for all partial closures ____________
   b. Fence post unit cost ($/post) ____________ ($29/post; p. 3-7)
   c. Fence post cost ($) Line 2a x Line 2b ____________
3. Plat Submittal
   a. Attorney time required (hrs/partial closure) ____________
   b. Attorney unit labor cost ($/hr) ____________ ($100/hr; p. 9-3)
   c. Attorney cost ($) Line 1a x Line 3a x Line 3b ____________
   d. Clerical time required (hrs/partial closure) ____________
   e. Clerical unit labor cost ($/hr) ____________ ($18/hr; p. 9-3)
   f. Clerical cost ($) Line 1a x Line 3d x Line 3e ____________
   g. Plat submittal cost ($) Line 3c + Line 3f ____________
4. Notice to Local Land Authority Subtotal ($) Line 1d + Line 2c + Line 3g ☐

WORKSHEET D-15

Survey Plat - Final Closure

1. Surveying of Waste Management Area Boundaries

   a. Land surveying team time required (hrs) ________

   b. Land surveying team unit labor cost ($/hr) ________ ($75/hr; p. 9-3)

   c. Land surveying cost ($) Line 1a x Line 1b ________

2. Fence Posts to Mark Boundaries

   a. Number of fence posts ________

   b. Fence post unit cost ($/post) ________ ($29/post; p. 3-7)

   c. Fence post cost ($) Line 2a x Line 2b ________

3. Plat Submittal

   a. Attorney time required (hrs) ________

   b. Attorney unit labor cost ($/hr) ________ ($100/hr; p. 9-3)

   c. Attorney cost ($) Line 3a x Line 3b ________

   d. Clerical time required (hrs) ________

   e. Clerical unit labor cost ($/hr) ________ ($18/hr; p. 9-3)

   f. Clerical cost ($) Line 3d x Line 3e ________

   g. Plat submittal cost ($) Line 3c + Line 3f ________

4. Notice to Local Land Authority Subtotal ($) Line 1c + Line 2c + Line 3g ☐

CHAPTER 3

SURFACE IMPOUNDMENT

This chapter contains the worksheets for estimating Part 264 or Part 265 closure costs and contingent closure costs (Part 264 only) for surface impoundments. There are two options for inventory management in surface impoundments--removing all wastes and waste residues or solidifying the waste and applying a final cover. Worksheets E-1 through E-6, E-11, and E-13 apply to all surface impoundments. Worksheet E-8 should be used if the wastes are to be removed. Worksheets E-9, E-10, E-12, and E-14 should be used if the impoundment is to be closed with the wastes left in place. Worksheet E-7 will be applicable if there is contaminated soil at the facility.

Under the Part 264 regulations, a contingent closure cost estimate must be prepared for a surface impoundment at which wastes are to be removed at closure and that does not meet the Part 264 liner requirements and is not exempt from them. The contingency closure cost estimate must include the cost of complying with the contingent closure plan (i.e., closure as a landfill) but is not required to include the cost of the expected closure by removal. Consequently, only one closure cost estimate, the contingent cost estimate needs to be prepared. Applicable sections of all surface impoundment worksheets except Worksheet E-8 should be completed for the contingent closure cost estimate.

The surface impoundment closure worksheets address the following items:

- Inventory Management
    1. Free liquid removal (maximum)
    2. On-site treatment free liquid
    3. Free liquid discharge to sewer (maximum)
    4. Sludge stabilization/solidification (maximum)
    5. Sludge removal (maximum)

6. Dewatering of wet sludge
7. Containerzation of bulk waste
8. Container loading
9. Off-site management of liquid, sludge, and/or treatment residue
10. Solidification of liquid prior to on-site landfill disposal
11. On-site disposal

- Leachate and/or Run-Off Management

  1. Leachate and/or run-off collection
  2. On-site treatment of leachate/run-off
  3. Treated leachate/run-off discharge to sewer
  4. Off-site management of leachate/run-off and/or treatment residue
  5. Solidification prior to on-site landfill disposal
  6. On-site disposal
  7. Leachate collection system maintenance
  8. Leak detection system maintenance

- Groundwater Monitoring - Part 264 Only

  1. Detection monitoring - background/upgradient wells
  2. Detection monitoring - compliance point/downgradient wells
  3. Compliance monitoring - background/upgradient wells
  4. Compliance monitoring - for selected hazardous constituents at compliance point/downgradient wells
  5. Compliance monitoring - for Appendix VIII constituents at compliance point/downgradient wells
  6. Administrative (reporting)
  7. Monitoring well maintenance and replacement

- Groundwater Monitoring - Part 265 Only

  1. Groundwater quality analysis
  2. Groundwater contamination analysis

3. Administrative (reporting)
4. Monitoring well maintenance and replacement

- Inspection and Repairs

  1. Inspection
  2. Fence installation or repair
  3. Other security equipment repair

- Testing for Soil Contamination

  1. Background samples and samples with potential contamination
  2. Preparation of isogram plan

- Decontamination

  1. Protective clothing and safety equipment for facility personnel
  2. Equipment decontamination
  3. Sump decontamination
  4. Other items needing decontamination
  5. On-site treatment of decontamination residues
  6. Testing for success of decontamination
  7. Treated residue discharge to sewer
  8. Off-site management of decontamination fluid/residue and/or treatment residue
  9. On-site disposal

- Removal of Contaminated Soil

  1. Protective clothing
  2. Excavation of contaminated soil and earthen berms
  3. Equipment decontamination
  4. On-site treatment of decontamination residues
  5. Treated residue discharge to sewer

6. Off-site management of contaminated soil, decontamination residue, and/or treatment residue
7. On-site disposal

- Containment/Liner System Removal

  1. Protective clothing
  2. Containment/liner system excavation
  3. Equipment decontamination
  4. On-site treatment of decontamination residues
  5. Treated residue discharge to sewer
  6. Off-site management of rubble, decontamination residue, and treatment residue
  7. On-site disposal

- Final Cover

  1. Native soil for slope and fill
  2. On-site clay
  3. Off-site clay
  4. Synthetic membrane
  5. Sand
  6. Gravel
  7. Drainage tile
  8. Geotextile filter fabric
  9. Topsoil
  10. Crushed stone
  11. Mobilization/demobilization

- Revegetation

  1. Soil preparation and grading
  2. Seeding

3. Fertilizing
4. Mulching
5. Mobilization/demobilization

- Certification of Partial Closures

  1. Independent registered professional engineer
  2. Clerical

- Survey Plat - Partial Closures

  1. Surveying of waste management area boundaries
  2. Fence posts to mark boundaries
  3. Plat submittal

- Certification of Final Closure

  1. Independent registered professional engineer
  2. Clerical

- Survey Plat - Final Closure

  1. Surveying of waste management area boundaries
  2. Fence posts to mark boundaries
  3. Plat submittal

WORKSHEET E-1

Inventory Management

1. Free Liquid Removal (Maximum)

   a. Maximum volume of free liquid in impoundment (gal) ____________

   b. Pumping unit cost ($/1000 gal) ____________ (p. 4-4)

   c. Pumping cost ($) (Line 1a ÷ 1000) x Line 1b ____________

   d. Evaporation unit cost ($/gal) ____________ ($0.045/gal; p. 4-3)

   e. Evaporation cost ($) Line 1a x Line 1d ____________

   f. Free liquid removal subtotal ($) Line 1c + Line 1e ____________

2. On-Site Treatment of Free Liquid

   a. Quantity of liquid to be treated (gal) ____________

   b. Chemicals required for treatment (lb/gal liquid or gal/gal liquid) ____________ (pp. 4-12 - 4-13)

   c. Chemicals unit cost ($/lb or $/gal) ____________

   d. Chemicals cost ($) Line 2a x Line 2b x Line 2c ____________

   e. Electricity required for treatment (kwh/gal liquid) ____________ (pp. 4-12 - 4-13)

   f. Electricity unit cost ($/kwh) ____________ ($0.05/kwh; p. 4-2)

   g. Electricity cost ($) Line 2a x Line 2e x Line 2f ____________

   h. Water required for treatment (gal/gal liquid) ____________ (pp. 4-12 - 4-13)

   i. Water unit cost ($/1000 gal) ____________ ($1.22/1000 gal; p. 4-2)

WORKSHEET E-1 (page 2)

j. Water cost ($)
[(Line 2a x Line 2h) ÷ 1000] x
Line 2i ______________

k. Fuel required for treatment
(MMBtu/gal liquid) ______________ (pp. 4-12 - 4-13)

l. Fuel unit cost ($/MMBtu) ______________ (p. 4-2)

m. Fuel cost ($)
Line 2a x Line 2k x Line 2l ______________

n. Labor required for treatement
(hrs/gallon liquid) ______________ (pp. 4-12 - 4-13)

o. Process operator unit labor cost
($/hr) ______________ ($26.50/hr; p. 9-3)

p. Labor cost ($)
Line 2a x Line 2n x Line 2o ______________

q. On-site treatment cost ($)
Line 2d + Line 2g + Line 2j +
Line 2m + Line 2p ______________

r. Residue generated from treatment
(gal) ______________

3. Free Liquid Discharge to Sewer (Maximum)

a. Maximum volume of liquid discharged
(gal) ______________

b. Sewer discharge unit cost
($/1000 gal) ______________ ($1.50/1000 gal;
p. 4-2)

c. Sewer discharge cost ($)
(Line 3a ÷ 1000) x Line 3b ______________

4. Sludge Stabilization/Solidification
(Maximum)

a. Maximum quantity of sludge in
impoundment (tons) ______________*

b. Stabilization unit cost
($/ton of sludge) ______________ ($100/ton of sludge;
p. 4-6)

c. Stabilization cost ($)
Line 4a x Line 4b ______________

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* Conversion factors are provided in the Volume III appendix.

WORKSHEET E-1 (page 3)

5. Sludge Removal (Maximum)

    a. Maximum volume of sludge to be removed by dredge or dragline (yd^3) ______________*

    b. Maximum volume of sludge to be excavated (yd^3) ______________*

    c. Dredging or dragline unit cost (\$/yd^3) ______________(p. 4-5)

    d. Excavation unit cost (\$/yd^3) ______________(p. 4-5)

    e. Mobilization/demobilization cost (\$) ______________(p. 4-5)

    f. Sludge dredging/excavation cost (\$) (Line 5a x Line 5c) + (Line 5b x Line 5d) + Line 5e ______________

6. Dewatering of Wet Sludge

    a. Sludge quantity to be dewatered (tons) ______________*

    b. Dewatering unit cost (\$/wet ton) ______________(\$5.50/wet ton; p. 4-9)

    c. Dewatering cost (\$) Line 6a x Line 6b ______________

    d. Change in sludge quantity (decimal < 1) ______________(0.17; p. 4-9)

    e. Final dewatered sludge quantity (tons) Line 6a x Line 6d ______________

7. Containerization of Bulk Waste

    a. Quantity of waste to be containerized (gal) ______________*

    b. Container capacity (gal/container) ______________(55 gal/container; p. 4-6)

    c. Number of containers needed Line 7a ÷ Line 7b ______________

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* Conversion factors are provided in the Volume III appendix.

WORKSHEET E-1 (page 4)

d. Containerization unit cost
($/container) ______________ (pp. 4-6 and 4-8)

e. Containerization cost ($)
Line 7c x Line 7d ______________

8. Container Loading

a. Number of pallets
Line 7c ÷ 4
(round up to nearest to integer) ______________

b. Loading unit cost
($/pallet) ______________ ($4.66/pallet; p.4-8)

c. Container loading cost ($)
Line 8a x Line 8b ______________

9. Off-Site Management of Liquid, Sludge, and/or Treatment Residue

a. Off-site management method ______________

b. Volume to be managed off-site (tons) ______________ *

c. Truck capacity (tons) ______________

d. Number of loads
Line 9b ÷ Line 9c
(round up to nearest integer) ______________

e. Transportation unit cost ($/mi) ______________ ($4.50/mi; p. 4-15)**

f. One-way distance (mi/load) ______________

g. Transportation cost ($)
Line 9d x Line 9e x Line 9f ______________

h. Off-site management unit cost
($/ton) ______________ (pp. 4-13 - 4-20)

i. Off-site management cost ($)
Line 9b x Line 9h ______________

j. Off-site management
subtotal ($)
Line 9g + Line 9i ______________

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* Conversion factors are provided in the Volume III appendix.

** Based on a 250-mile one-way distance.

WORKSHEET E-1 (page 5)

10. Solidification of Liquid Prior to On-Site Landfill Disposal

    a. Quantity to be solidified (tons) ______________*

    b. Type of solidification material ______________

    c. Solidification unit cost ($/ton) ______________(p. 4-11)

    d. Solidification cost ($) Line 10a x Line 10c ______________

    e. Change in waste quantity (factor ≥ 1) ______________(1.0; p. 4-11)

    f. Final solidified waste quantity (tons) Line 10a x (1 + Line 10e) ______________

11. On-Site Disposal

    Include volume on one or more worksheets:
        Landfill Inventory - Line 1c, Line 1d, Line 1p
        Incinerator Inventory - Line 1b, Line 1g, Line 1n
        Land Treatment Inventory - Line 1i, Line 1j, Line 1o

12. Surface Impoundment Inventory Management Subtotal ($)

    Line 1f + Line 2q + Line 3c + Line 4c +
    Line 5f + Line 6c + Line 7e + Line 8c +
    Line 9j + Line 10d

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* Conversion factors are provided in the Volume III appendix.

WORKSHEET E-2

Leachate and/or Run-Off Management

1. Leachate and/or Run-Off Collection

   a. Leachate and/or run-off volume collected during closure (gal) ______________

   b. Time required for pumping (hrs)
   Line 1a ÷ 8000
   (round up to nearest integer) ______________

   c. Pumping unit cost ($/hr) ______________ ($23/hr; p. 4-11)

   d. Pump rental cost, optional ($/hr) ______________ ($2.70/hr; p. 4-11)

   e. Pumping cost ($)
   Line 1b x (Line 1c + Line 1d) ______________

2. On-Site Treatment of Leachate/Run-Off

   a. Quantity of leachate/run-off to be treated (gal) ______________

   b. Chemicals required for treatment (lb/gal leachate/run-off or gal/gal leachate/run-off) ______________ (pp. 4-12 - 4-13)

   c. Chemicals unit cost ($/lb or $/gal) ______________

   d. Chemicals cost ($)
   Line 2a x Line 2b x Line 2c ______________

   e. Electricity required for treatment (kwh/gal leachate/run-off) ______________ (pp. 4-12 - 4-13)

   f. Electricity unit cost ($/kwh) ______________ ($0.05/kwh; p. 4-2)

   g. Electricity cost ($)
   Line 2a x Line 2e x Line 2f ______________

   h. Water required for treatment (gal/gal leachate/run-off) ______________ (pp. 4-12 - 4-13)

   i. Water unit cost ($/1000 gal) ______________ ($1.22/1000 gal; p. 4-2)

   j. Water cost ($)
   [(Line 2a x Line 2h) ÷ 1000] x Line 2i ______________

   k. Fuel required for treatment (MMBtu/gal leachate/run-off) ______________ (pp. 4-12 - 4-13)

WORKSHEET E-2 (page 2)

l. Fuel unit cost ($MMBtu) ______________ (p. 4-2)

m. Fuel cost ($)
Line 2a x Line 2k x Line 2l ______________

n. Labor required for treatment
(hrs/gallon leachate/run-off) ______________ (pp. 4-12 - 4-13)

o. Process operator unit labor
cost ($/hr) ______________ ($26.50/hr; p. 9-3)

p. Labor cost ($)
Line 2a x Line 2n x Line 2o ______________

q. On-site treatment cost ($)
Line 2d + Line 2g + Line 2j +
Line 2m + Line 2p ______________

r. Residue generated from treatment
(gal) ______________

3. Treated Leachate/Run-Off Discharge to Sewer

a. Quantity discharged (gal) ______________

b. Sewer discharge unit cost
($/1000 gal) ______________ ($1.50/1000 gal;
p. 4-2)

c. Sewer discharge cost ($)
(Line 3a ÷ 1000) x Line 3b ______________

4. Off-Site Management of Leachate/Run-Off
and/or Treatment Residue

a. Amount to be managed off-site (tons) ______________ *

b. Truck capacity (tons) ______________

c. Number of loads
Line 4a ÷ Line 4b
(round up to nearest integer) ______________

d. One-way distance (mi/load) ______________

e. Transportation unit cost ($/mi) ______________ ($4.50/mi; p. 4-15)**

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* Conversion factors are provided in the Volume III appendix.

** Based on a 250-mile one-way distance.

WORKSHEET E-2 (page 3)

f. Transportation cost ($)
Line 4c x Line 4d x Line 4e ______________

g. Off-site management unit cost
($/ton) ______________(pp. 4-13 - 4-20)

h. Off-site management cost ($)
Line 4a x Line 4g ______________

i. Off-site management subtotal ($)
Line 4f + Line 4h ______________

5. Solidification Prior to On-Site Landfill Disposal

a. Quantity to be solidified (tons) ______________*

b. Type of solidification material ________________

c. Solidification unit cost ($/ton) ______________(p. 4-11)

d. Solidification cost ($)
Line 5a x Line 5c ______________

e. Change in waste quantity
(factor ≥ 1) ______________(1.0; p. 4-11)

f. Final solidified wate
quantity (tons)
Line 5a x (1 + Line 5e) ______________

6. On-Site Disposal

Include volume on one or more worksheets:
Landfill Inventory - Line 1b, Line 1f, Line 1g, Line 1p
Incinerator Inventory - Line 1j, Line 1k, Line 1m, Line 1n
Land Treatment Inventory - Line 1h, Line 1m, Line 1n, Line 1o

7. Leachate Collection System Maintenance (if applicable)

a. Maintenance time required (hrs) ______________

b. Unit labor cost ($/hr) ______________($23/hr; p. 9-3)

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* Conversion factors are provided in the Volume III appendix.

WORKSHEET E-2 (page 4)

c. Maintenance labor cost ($)
Line 7a x Line 7b ______________

d. Number of pumps needing replacement ______________

e. Pump unit cost ($/pump) ______________(p. 3-4)

f. Pump cost ($)
Line 7d x Line 7e ______________

g. Total maintenance cost ($)
Line 7c + Line 7f ______________

8. Leak Detection System Maintenance (if applicable)

a. Maintenance time required (hrs) ______________

b. Unit labor cost ($/hr) ______________($23/hr; p. 9-3)

c. Maintenance labor cost ($)
Line 8a x Line 8b ______________

d. Number of pumps needing replacement ______________

e. Pump unit cost ($/pump) ______________(p. 3-4)

f. Pump cost ($)
Line 8d x Line 8e ______________

g. Total maintenance cost ($)
Line 8c + Line 8f ______________

9. Leachate and/or Run-Off Management Subtotal ($)
Line 1e + Line 2q + Line 3c +
Line 4i + Line 5d + Line 7g +
Line 8g

WORKSHEET E-3, PART 264 ONLY

Groundwater Monitoring

1. Detection Monitoring - Background/ Upgradient Wells (continuation of monitoring program from operating period)

a. Number of wells ______________

b. Number of samples collected per well (samples/well) ______________

c. Number of replicate analyses per sample (replicates/sample) ______________

d. Number of analyses Line 1a x Line 1b x Line 1c ______________(minimum of 4)

e. Sample collection and preparation time required (hrs/well) ______________(4 hrs/well; p. 2-9)

f. Transportation time to and from site (hrs) ______________

g. Contract lab technician unit labor cost ($/hr) ______________($20.50/hr; p. 9-3)

h. Sample collection time (hrs) (Line 1a x Line 1e) + Line 1f ______________

i. Sampling cost ($) Line 1g x Line 1h ______________

j. Contract lab fee ($/analysis) ______________(p. 2-10)

k. Contract lab cost ($) Line 1d x Line 1j ______________

l. Number of times upgradient detection monitoring samples are collected during closure ______________(quarterly for one year; p. 2-3)

m. Upgradient/background detection monitoring cost ($) (Line 1i + Line 1k) x Line 1l ______________

WORKSHEET E-3, PART 264 ONLY (page 2)

2. Detection Monitoring - Compliance Point/Downgradient Wells (continuation of monitoring program from operating period)

   a. Number of wells __________

   b. Number of samples collected per well (samples/well) __________

   c. Number of replicate analyses per sample (replicates/sample) __________

   d. Number of analyses Line 2a x Line 2b x Line 2c __________

   e. Sample collection and preparation time required (hrs/well) __________(4 hrs/well; p. 2-9)

   f. Transportation time to and from site (hrs) __________

   g. Contract lab technician unit labor cost ($/hr) __________($20.50/hr; p. 9-3)

   h. Sample collection time (hrs) (Line 2a x Line 2e) + Line 2f __________

   i. Sampling cost ($) Line 2g x Line 2h __________

   j. Contract lab fee ($/analysis) __________(p. 2-10)

   k. Contract lab cost ($) Line 2d x Line 2j __________

   l. Number of times downgradient detection monitoring samples are collected during closure __________(twice/year; p. 2-3)

   m. Downgradient/compliance point detection monitoring cost ($) (Line 2i + Line 2k) x Line 2l __________

3. Compliance Monitoring - Background/Upgradient Wells (continuation of monitoring program from operating period)

   a. Number of wells __________

WORKSHEET E-3, PART 264 ONLY (page 3)

b. Number of samples collected per well (samples/well) ______________

c. Number of replicate analyses per sample (replicates/sample) ______________

d. Number of analyses Line 3a x Line 3b x Line 3c ______________(minimum of 4)

e. Sample collection and preparation time required (hrs/well) ______________(4 hrs/well; p. 2-9)

f. Transportation time to and from site (hrs) ______________

g. Contract lab technician unit labor cost ($/hr) ______________($20.50/hr; p. 9-3)

h. Sample collection time (hrs) (Line 3a x Line 3e) + Line 3f ______________

i. Sampling cost ($) Line 3g x Line 3h ______________

j. Contract lab fee ($/analysis) ______________(p. 2-10)

k. Contract lab cost ($) Line 3d x Line 3j ______________

l. Number of times upgradient compliance monitoring samples are collected during closure ______________(quarterly for one year; p. 2-4)

m. Upgradient/background compliance monitoring cost ($) (Line 3i + Line 3k) x Line 3l ______________

4. Compliance Monitoring - for Selected Hazardous Constituents at Compliance Point/Downgradient Wells (continuation of monitoring program from operating period)

a. Number of wells ______________

b. Number of samples collected per well (samples/well) ______________

c. Number of replicate analyses per sample (replicates/sample) ______________

WORKSHEET E-3, PART 264 ONLY (page 4)

d. Number of analyses Line 4a x Line 4b x Line 4c ______________

e. Sample collection and preparation time required (hrs/well) ______________(4 hrs/well; p. 2-9)

f. Transportation time to and from site (hrs) ______________

g. Contract lab technician unit labor cost ($/hr) ______________($20.50/hr; p. 9-3)

h. Sample collection time (hrs) (Line 4a x Line 4e) + Line 4f ______________

i. Sampling cost ($) Line 4g x Line 4h ______________

j. Contract lab fee ($/analysis) ______________(p. 2-10)

k. Contract lab cost ($) Line 4d x Line 4j ______________

l. Number of times downgradient hazardous constituent compliance monitoring samples are collected during closure ______________(quarterly; p. 2-4)

m. Downgradient hazardous constituent compliance monitoring cost ($) (Line 4i + Line 4k) x Line 4l ______________

5. Compliance Monitoring - for Appendix VIII Constituents at Compliance Point/Downgradient Wells (continuation of monitoring program from operating period)

a. Number of wells ______________

b. Number of samples collected per well (samples/well) ______________

c. Number of replicate analyses per sample (replicates/sample) ______________

d. Number of analyses Line 5a x Line 5b x Line 5c ______________

e. Sample collection and preparation time required (hrs/well) ______________(4 hrs/well; p. 2-9)

WORKSHEET E-3, PART 264 ONLY (page 5)

f. Transportation time to and from site (hrs) ____________

g. Contract lab technician unit labor costs ($/hr) ____________ ($20.50/hr; p. 9-3)

h. Sample collection time (hrs) (Line 5a x Line 5e) + Line 5f ____________

i. Sampling cost ($) Line 5g x Line 5h ____________

j. Contract lab fee ($/analysis) ____________ (p. 2-10)

k. Contract lab cost ($) Line 5d x Line 5j ____________

l. Number of times downgradient Appendix VIII compliance monitoring samples are collected during closure ____________ (annually; p. 2-4)

m. Downgradient Appendix VIII constituents compliance monitoring cost ($) (Line 5i + Line 5k) x Line 4l ____________

6. Administrative (Reporting)

a. Number of analyses
(Line 1d x Line 1l) +
(Line 2d x Line 2l) +
(Line 3d x Line 3l) +
(Line 4d x Line 4l) +
(Line 5d x Line 5l) ____________

b. Contract lab technician time required (hrs/analysis) ____________

c. Contract lab technician unit labor cost ($/hr) ____________ ($20.50/hr; p. 9-3)

d. Technician cost ($) Line 6a x Line 6b x Line 6c ____________

e. Clerical time required (hrs/analysis) ____________

f. Clerical unit labor cost ($/hr) ____________ ($18/hr; p. 9-3)

g. Clerical cost ($) Line 6a x Line 6e x Line 6f ____________

h. Administration subtotal ($) Line 6d + Line 6g ____________

WORKSHEET E-3, PART 264 ONLY (page 6)

7. Monitoring Well Maintenance and Replacement

   a. Total number of wells __________

   b. Maintenance time required (hrs/well) __________

   c. Unit labor cost ($/hr) __________($23/hr; p. 9-3)

   d. Monitoring well maintenance cost ($) Line 7a x Line 7b x Line 7c __________

   e. Number of wells needing replacement __________

   f. Existing monitoring well sealing unit cost ($/well) __________($300/well; p. 3-5)*

   g. New monitoring well construction unit cost ($/well) __________($4125/well; p. 3-5)*

   h. Mobilization/demobilization ($) __________($150; p. 3-5)

   i. Monitoring well replacement cost ($) [Line 7e x (Line 7f + Line 7g)] + Line 7h __________

   j. Number of pumps needing replacement __________(p. 3-5)

   k. Pump unit cost ($/pump) __________

   l. Pump cost ($) Line 7j x Line 7k __________

   m. Number of wells needing tubing replacement __________

   n. Length of tubing (ft/well) __________

   o. Tubing unit cost ($/ft) __________(p. 3-5)

   p. Tubing replacement cost ($) Line 7m x Line 7n x Line 7o __________

   q. Number of wells needing cap replacement __________

   r. Well cap unit cost ($/cap) __________

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* Based on a depth of 100 vertical lineal feet.

WORKSHEET E-3, PART 264 ONLY (page 7)

s. Well cap replacement cost ($)
Line 7q x Line 7r ______

t. Monitoring well maintenance and replacement cost ($)
Line 7d + Line 7h + Line 7i +
Line 7l + Line 7p + Line 7s ______

8. Groundwater Monitoring Subtotal ($)
Line 1m + Line 2m + Line 3m +
Line 4m + Line 5m + Line 6h + Line 7t ☐

WORKSHEET E-3, PART 265 ONLY

Groundwater Monitoring

1. Groundwater Quality Analysis

    a. Number of wells ______________ (minimum of 4; p. 2-1)

    b. Number of samples collected per well (samples/well) ______________

    c. Number of replicate analyses per sample (replicates/sample) ______________

    d. Number of analyses Line 1a x Line 1b x Line 1c ______________

    e. Sample collection and preparation time required (hrs/well) ______________ (4 hrs/well; p. 2-4)

    f. Transportation time to and from site (hrs) ______________

    g. Contract lab technician unit labor cost ($/hr) ______________ ($20.50/hr; p. 9-3)

    h. Sample collection time (hrs) (Line 1a x Line 1e) + Line 1f ______________

    i. Sampling cost ($) Line 1g x Line 1h ______________

    j. Contract lab fee ($/analysis) ______________ ($85/analysis; p. 2-5)

    k. Contract lab cost ($) Line 1d x Line 1j ______________

    l. Number of times groundwater quality samples are collected during closure ______________

    m. Groundwater quality sampling cost ($) (Line 1i + Line 1k) x Line 1l ______________

2. Groundwater Contamination Analysis

    a. Number of wells ______________ (minimum of 4; p. 2-1)

    b. Number of samples collected per well (samples/well) ______________

WORKSHEET E-3, PART 265 ONLY (page 2)

c. Number of replicate analyses per sample (replicates/sample) __________ (4 replicates/sample; p. 2-2)

d. Number of analyses
Line 2a x Line 2b x Line 2c __________

e. Sample collection and preparation time required (hrs/well) __________ (4 hrs/well; p. 2-6)

f. Transportation time to and from site (hrs) __________

g. Contract lab technician unit labor cost ($/hr) __________ ($20.50/hr; p. 9-3)

h. Sample collection time (hrs)
(Line 2a x Line 2e) + Line 2f __________

i. Sampling cost ($)
Line 2g x Line 2h __________

j. Contract lab fee ($/analysis) __________ ($120/analysis; p. 2-7)

k. Contract lab cost ($)
Line 2d x Line 2j __________

l. Number of times groundwater contamination samples are collected during closure __________

m. Groundwater contamination sampling cost ($)
(Line 2i + Line 2k) x Line 2l __________

3. Administrative (Reporting)

a. Total number of analyses
(Line 1d x Line 1l) +
(Line 2d x Line 2l) __________

b. Contract lab technician time required (hrs/analysis) __________

c. Technician unit labor cost ($/hr) __________ ($20.50/hr; p. 9-3)

d. Technician cost ($)
Line 3a x Line 3b x Line 3c __________

e. Clerical time required (hrs/set of analysis) __________

WORKSHEET E-3, PART 265 ONLY (page 3)

f. Clerical unit labor cost ($/hr) ________ ($18/hr; p. 9-3)

g. Clerical cost ($)
Line 3a x Line 3e x Line 3f ________

h. Administration subtotal ($)
Line 3d + Line 3g ________

4. Monitoring Well Maintenance and Replacement

a. Total number of wells ________

b. Maintenance time required (hrs/well) ________

c. Unit labor cost ($/hr) ________ ($23/hr; p. 9-3)

d. Monitoring well maintenance cost ($)
Line 4a x Line 4b x Line 4c ________

e. Number of wells needing replacement ________

f. Existing monitoring well sealing unit cost ($/well) ________ ($300/well; p. 3-5)*

g. New monitoring well construction unit cost ($/well) ________ ($4125/well; p. 3-5)*

h. Mobilization/demobilization ($) ________ ($150; p. 3-5)

i. Monitoring well replacement cost ($)
[Line 4e x (Line 4f + Line 4g)] + Line 4h ________

j. Number of pumps needing replacement ________ (p. 3-5)

k. Pump unit cost ($/pump) ________

l. Pump cost ($)
Line 4j x Line 4k ________

m. Number of wells needing tubing replacement ________

n. Length of tubing (ft/well) ________

---

* Based on a depth of 100 vertical lineal feet.

WORKSHEET E-3, PART 265 ONLY (page 4)

o. Tubing unit cost ($/ft) ______________(p. 3-5)

p. Tubing replacement cost ($)
Line 4m x Line 4n x Line 4o ______________

q. Number of wells needing cap replacement ______________

r. Well cap unit cost ($/cap) ______________

s. Well cap replacement cost ($)
Line 4q x Line 4r ______________

t. Monitoring well maintenance and replacement cost ($)
Line 4d + Line 4h + Line 4i +
Line 4l + Line 4p + Line 4s ______________

5. Groundwater Monitoring Subtotal ($)
Line 1m + Line 2m + Line 3h + Line 4t ☐

WORKSHEET E-4

Inspection and Repairs

1. Inspection

   a. Time required for inspection by technician (hrs) ______

   b. Technician unit labor cost ($/hr) ______ ($20.50/hr; p. 9-3)

   c. Technician cost ($) Line 1a x Line 1b ______

   d. Engineer time required (hrs) ______

   e. Engineer unit labor cost ($/hr) ______ ($45.50/hr; p. 9-3)

   f. Engineer cost ($) Line 1d x Line 1e ______

   g. Clerical time required (hrs) ______

   h. Clerical unit labor cost ($/hr) ______ ($18/hr; p. 9-3)

   i. Clerical cost ($) Line 1g x Line 1h ______

   j. Inspection subtotal ($) Line 1c + Line 1f + Line 1i ______

2. Fence Installation or Repair

   a. Amount of fence to be installed or replaced (L.F.) ______

   b. Fencing unit cost ($/L.F.) ______ ($10.55/L.F.; p. 3-8)

   c. Fence cost ($) Line 2a x Line 2b ______

   d. Number of gates needed ______

   e. Gate unit cost ($/gate) ______ ($80/gate; p. 3-8)

   f. Gate cost ($) Line 2d x Line 2e ______

   g. Number of fence posts needed ______

   h. Fence post unit cost ($/post) ______ ($57/post; p. 3-8)

WORKSHEET E-4 (page 2)

i. Fence post cost ($)
Line 2g x Line 2h ______________

j. Fence installation/repair cost ($)
Line 2c + Line 2f + Line 2i ______________

3. Other Security Equipment Repair

a. Types of equipment needing
repair or replacement ______________________________

b. Number of items needing replacement ______________

c. Replacement unit cost ($/item) ______________ (p. 3-8)

d. Security equipment replacement
cost ($)
Line 3b x Line 3c ______________

4. Inspection and Repairs Subtotal ($)
Line 1j + Line 2j + Line 3d ☐

WORKSHEET E-5

Testing for Soil Contamination

1. Background Samples and Samples with Potential Contamination
    a. Number of soil samples to be taken ______
    b. Number of samples requiring coring through concrete/asphalt foundations/pads ______
    c. Thickness of foundation/pad (inches) ______
    d. Unit cost for coring through/removing concrete/asphalt foundations/pads ($/sample) ______ ($15/inch; p. 6-1)
    e. Sample collection time required (hrs/sample) ______ (1 hr/sample; p. 2-12)
    f. Transportation time to and from site (hrs) ______
    g. Contract lab technician unit labor cost ($/hr) ______ ($20.50/hr; p. 9-3)
    h. Sample collection time (hrs) (Line 1a x Line 1e) + Line 1f ______
    i. Sampling cost ($) (Line 1b x Line 1c x Line 1d (Line 1g x Line 1h) ______
    j. Contract lab fee ($/sample) ______ (p. 2-13)
    k. Contract lab cost ($) Line 1a x Line 1j ______
    l. Sample cost ($) Line 1i + Line 1k ______

2. Preparation of Isogram Plan
    a. Engineer time required (hrs) ______
    b. Engineer unit labor cost ($/hr) ______ ($45.50/hr; p. 9-3)
    c. Engineer cost ($) Line 2a x Line 2b ______
    d. Draftsperson time required (hrs) ______
    e. Draftsperson unit labor cost ($/hr) ______ ($24/hr; p. 9-3)

WORKSHEET E-5 (page 2)

f. Draftsperson cost ($)
Line 2d x Line 2e ______________

g. Clerical time required (hrs) ______________

h. Clerical unit labor cost ($/hr) ______________($18/hr; p. 9-3)

i. Clerical cost ($)
Line 2g x Line 2h ______________

j. Isogram plan cost ($)
Line 2c + Line 2f + Line 2i ______________

3. Soil Testing Subtotal ($)
Line 1l + Line 2j ☐

WORKSHEET E-6

Decontamination

1. Protective Clothing and Safety Equipment for Facility Personnel

   a. Number of personnel requiring protective clothing and safety equipment for decontamination ______

   b. Safety equipment and protective clothing unit cost ($/person) ______ ($80/person; p. 5-6)

   c. Safety equipment and protective clothing cost ($) Line 1a x Line 1b ______

2. Equipment Decontamination

   a. Equipment needing decontamination:

      - pumps and feed lines
      - heavy equipment (e.g., fork lifts, dozers, etc.)
      - other equipment (list)______

        ______

   b. Number of pumps and lines ______

   c. Pumps and lines decontamination cost ($) ______(p. 5-4)

   d. Residual generation rate for pump and line decontamination ______(50 gal/pump and line; p. 5-1)

   e. Residual generated from pump and line decontamination (gal) Line 2b x Line 2d ______

   f. Heavy equipment decontamination cost ($) ______(p. 5-2)

   g. Total heavy equipment decontamination time (hrs) ______(p. 5-2)

   h. Residual generation rate for heavy equipment decontamination (gal/hr) ______(100 gal/hr; p. 5-1)

WORKSHEET E-6 (page 2)

i. Residual generated from heavy equipment decontamination (gal)
Line 2g x Line 2h __________

j. Equipment decontamination cost ($)
Line 2c + Line 2f __________

k. Contaminated fluid and/or residues generated (gal)
Line 2e + Line 2i __________

3. Sump Decontamination

a. Method of sump decontamination __________

b. Volume to be pumped from sump(s) (gal) __________

c. Time required for pumping (hrs)
Line 3b ÷ 8000
(round up to nearest integer) __________

d. Pumping unit cost ($/hr) __________ ($23/hr; p. 4-11)

e. Pump rental cost, optional ($/hr) __________ ($2.70/hr; p. 4-11)

f. Pumping cost ($)
(Line 3c x Line 3d) + Line 3e __________

g. Sump area to be decontaminated (ft^2) __________

h. Sump decontamination unit cost ($/ft^2) __________ (p. 5-3)

i. Sump decontamination cost ($)
Line 3g x Line 3h __________

j. Sump decontamination subtotal ($)
Line 3f + Line 3i __________

k. Residual generation rate for sump decontamination (gal/ft^2) __________ (p. 5-3)

l. Contaminated fluid and/or residues generated (gal)
Line 3b + (Line 3g x Line 3k) __________

WORKSHEET E-6 (page 3)

4. Other Items Needing Decontamination

   a. List items ____________________

   ____

   b. Method of decontamination for other items ____________________

   c. Surface area of other items to be decontaminated (ft^2) ____________

   d. Decontamination unit cost ($\$/ft^2$) ____________ (p. 5-3)

   e. Decontamination of other items subtotal ($)
   Line 4c x Line 4d ____________

   f. Residual generation r[illegible]r decontamination of ot[illegible]ms (gal/ft^2) ____________ (p. 5-3)

   g. Contaminated fluid and/or residues generated (gal)
   Line 4c x Line 4f ____________

5. On-Site Treatment of Decontamination Residues

   a. Quantity of residue to be treated (gal) ____________

   b. Chemicals required for treatment (lb/gal residue or gal/gal residue) ____________ (pp. 4-12 - 4-13)

   c. Chemicals unit cost ($/lb or $/gal) ____________

   d. Chemicals cost ($)
   Line 5a x Line 5b x Line 5c ____________

   e. Electricity required for treatment (kwh/gal residue) ____________ (pp. 4-12 - 4-13)

   f. Electricity unit cost ($/kwh) ____________ ($0.05/kwh; p. 4-2)

   g. Electricity cost ($)
   Line 5a x Line 5e x Line 5f ____________

   h. Water required for treatment (gal/gal residue) ____________ (pp. 4-12 - 4-13)

   i. Water unit cost ($/1000 gal) ____________ ($1.22/1000 gal; p. 4-2)

WORKSHEET E-6 (page 4)

j. Water cost ($)
[(Line 5a x Line 5h) ÷ 1000] x
Line 5i ______________

k. Fuel required for treatment
(MMBtu/gal residue) ______________(pp. 4-12 - 4-13)

l. Fuel unit cost ($/MMBtu) ______________(p. 4-2)

m. Fuel cost ($)
Line 5a x Line 5k x Line 5l ______________

n. Labor required for treatment
(hrs/gallon residue) ______________(pp. 4-12 - 4-13)

o. Process operator unit labor cost
($/hr) ______________($26.50/hr; p. 9-3)

p. Labor cost ($)
Line 5a x Line 5n x Line 5o ______________

q. On-site treatment cost ($)
Line 5d + Line 5g + Line 5j +
Line 5m + Line 5p ______________

r. Residue generated from treatment
(gal) ______________

6. Testing for Success of Decontamination

a. Number of samples ______________

b. Sample collection time required
(hrs/sample) ______________

c. Technician unit labor cost ($/hr) ______________($20.50/hr; p. 9-3)

d. Sample collection time (hrs)
Line 6a x Line 6b ______________

e. Sampling cost ($)
Line 6c x Line 6d ______________

f. Cost to test each sample
($/sample) ______________(pp. 5-10 - 5-11)

g. Testing cost ($)
Line 6a x Line 6f ______________

h. Testing for success of
decontamination
Line 6e + Line 6g ______________

WORKSHEET E-6 (page 5)

7. Treated Residue Discharge to Sewer

   a. Volume of liquid discharged (gal) ____________

   b. Sewer discharge unit cost ($/1000 gal) ____________ ($1.50/1000 gal; p. 4-2)

   c. Sewer discharge cost ($) (Line 7a ÷ 1000) x Line 7b ____________

8. Off-Site Management of Decontamination Fluid/Residues and/or Treatment Residue

   a. Off-site management method ____________________

   b. Quantity to be managed off-site (tons) ____________*

   c. Truck capacity (tons) ____________

   d. Number of loads Line 8b ÷ Line 8c (round up to nearest integer) ____________

   e. One-way distance (mi/load) ____________

   f. Transportation unit cost ($/mi) ____________ ($4.50/mi; p. 4-15)**

   g. Transportation cost ($) Line 8d x Line 8e x Line 8f ____________

   h. Off-site management unit cost ($/ton) ____________ (pp. 4-13 - 4-20)

   i. Off-site management cost ($) Line 8b x Line 8h ____________

   j. Contaminated fluid and residue disposal subtotal ($) Line 8g + Line 8i ____________

9. On-Site Disposal

   Include volume on one or more worksheets:
   Landfill Inventory - Line 1n, Line 1p
   Incinerator Inventory - Line 1l, Line 1n
   Land Treatment Inventory - Line 1k, Line 1o

10. Facility Decontamination Subtotal ($) Line 1c + Line 2j + Line 3j + Line 4e + Line 5q + Line 6h + Line 7c + Line 8j ☐

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* Conversion factors are provided in the Volume III appendix.

** Based on a 250-mile one-way distance.

WORKSHEET E-7

Removal of Contaminated Soil

1. Protective Clothing

    a. Number of personnel requiring protective clothing for excavation and decontaminating __________

    b. Protective clothing unit cost ($/person) __________ ($77/person; p. 6-8)

    c. Protective clothing cost ($) Line 1a x Line 1b __________

2. Excavation of Contaminated Soil and Earthen Berms

    a. Volume of contaminated soil/berms to be removed (yd^3) __________

    b. Excavation unit cost, including loading ($/yd^3) __________ (pp. 6-3 - 6-7)

    c. Mobilization/demobilization cost ($) __________ (pp. 4-5, 4-7, 4-10, and 6-3)

    d. Contaminated soil/berm removal cost before surcharge ($) (Line 2a x Line 2b) + Line 2c __________

    e. Surcharge factor __________ (1.0; pp. 6-8 - 6-9)

    f. Contaminated soil/berm removal subtotal ($) Line 2d x (1 + Line 2e) __________

3. Equipment Decontamination

    a. Total heavy equipment decontamination time (hrs) __________ (p. 5-2)

    b. Heavy equipment decontamination cost ($) __________ (p. 5-2)

    c. Residual generation rate for heavy equipment decontamination (gal/hr) __________ (100 gal/hr; p. 5-1)

    d. Contaminated fluid and/or residues generated (gal) Line 3a x Line 3c __________

WORKSHEET E-7 (page 2)

4. On-Site Treatment of Decontamination Residues

a. Quantity of residue to be treated (gal) ____________

b. Chemicals required for treatment (lb/gal residue or gal/gal residue) ____________ (pp. 4-12 - 4-13)

c. Chemicals unit cost ($/lb or $/gal) ____________

d. Chemicals cost ($) Line 4a x Line 4b x Line 4c ____________

e. Electricity required for treatment (kwh/gal residue) ____________ (pp. 4-12 - 4-13)

f. Electricity unit cost ($/kwh) ____________ ($0.05/kwh; p. 4-2)

g. Electricity cost ($) Line 4a x Line 4e x Line 4f ____________

h. Water required for treatment (gal/gal residue) ____________ (pp. 4-12 - 4-13)

i. Water unit cost ($/1000 gal) ____________ ($1.22/1000 gal; p. 4-2)

j. Water cost ($) [(Line 4a x Line 4h) ÷ 1000] x Line 4i ____________

k. Fuel required for treatment (MMBtu/gal residue) ____________ (pp. 4-12 - 4-13)

l. Fuel unit cost ($/MMBtu) ____________ (p. 4-2)

m. Fuel cost ($) Line 4a x Line 4k x Line 4l ____________

n. Labor required for treatment (hrs/gallon residue) ____________ (pp. 4-12 - 4-13)

o. Process operator unit labor cost ($/hr) ____________ ($26.50/hr; p. 9-3)

p. Labor cost ($) Line 4a x Line 4n x Line 4o ____________

WORKSHEET E-7 (page 3)

q. On-site treatment cost ($)
Line 4d + Line 4g + Line 4j +
Line 4m + Line 4p __________

r. Residue generated from treatment
(gal) __________

5. Treated Residue Discharge to Sewer

a. Volume of liquid discharged (gal) __________

b. Sewer discharge unit cost
($/1000 gal) __________ ($1.50/1000 gal;
p. 4-2)

c. Sewer discharge cost ($)
(Line 5a ÷ 1000) x Line 5b __________

6. Off-Site Management of Contaminated
Soil, Decontamination Residue, and/or
Treatment Residue

a. Quantity to be managed off-site
(tons) __________*

b. Truck capacity (tons) __________

c. Number of loads
Line 6a ÷ Line 6b
(round up to nearest integer) __________

d. One-way distance (mi/load) __________

e. Transportation unit cost ($/mi) __________($4.50/mi; p. 4-15)**

f. Transportation cost ($)
Line 6c x Line 6d x Line 6e __________

g. Off-site management unit
cost ($/ton) __________(pp. 4-13 - 4-20)

h. Off-site management cost ($)
Line 6a x Line 6g __________

i. Off-site management subtotal ($)
Line 6f + Line 6h __________

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* Conversion factors are provided in the Volume III appendix.

** Based on a 250-mile one-way distance.

WORKSHEET E-7 (page 4)

7. On-Site Disposal

Include volume on one or more worksheets:
    Landfill Inventory - Line 1n, Line 1o, Line 1p
    Incinerator Inventory - Line 1l, Line 1n, Line 1o
    Land Treatment Inventory - Line 1k, Line 1l, Line 1o

8. Contaminated Soil Removal Subtotal ($)
Line 1c + Line 2f + Line 3b + Line 4q +
Line 5c + Line 6i

WORKSHEET E-8

Containment/Liner System Removal

1. Protective Clothing

   a. Number of personnel requiring protective clothing for excavation ______________

   b. Protective clothing unit cost ($/person) ______________ ($77/person; p. 6-8)

   c. Protective clothing cost ($) Line 1a x Line 1b ______________

2. Containment/Liner System Excavation

   a. Volume of containment system, including earthen berms, to be removed (yd^3) ______________

   b. Excavation unit cost, including loading ($\$/yd^3$) ______________ (pp. 6-3 - 6-7)

   c. Containment system/berm removal cost ($) Line 2a x Line 2b ______________

   d. Mobilization/demobilization cost ($) ______________ (pp. 4-5, 4-7, 4-10, and 6-8)

   e. Containment system/berm excavation cost before surcharge ($) Line 2c + Line 2d ______________

   f. Surcharge factor ______________ (1.0; pp. 6-8 - 6-9)

   g. Containment/liner system/berm excavation cost ($) Line 2e x (1 + Line 2f) ______________

3. Equipment Decontamination

   a. Total heavy equipment decontamination time (hrs) ______________ (p. 5-2)

   b. Heavy equipment decontamination cost ($) ______________ (p. 5-2)

   c. Residual generation rate for heavy equipment decontamination (gal/hr) ______________ (100 gal/hr; p. 5-1)

   d. Contaminated fluid and/or residue generated (gal) Line 3a x Line 3c ______________

WORKSHEET E-8 (page 2)

4. On-Site Treatment of Decontamination Residues

   a. Quantity of residue to be treated (gal) ______________

   b. Chemicals required for treatment (lb/gal residue or gal/gal residue) ______________(pp. 4-12 - 4-13)

   c. Chemicals unit cost ($/lb or $/gal) ______________

   d. Chemicals cost ($) Line 4a x Line 4b x Line 4c ______________

   e. Electricity required for treatment (kwh/gal residue) ______________(pp. 4-12 - 4-13)

   f. Electricity unit cost ($/kwh) ______________($0.05/kwh; p. 4-2)

   g. Electricity cost ($) Line 4a x Line 4e x Line 4f ______________

   h. Water required for treatment (gal/gal residue) ______________(pp. 4-12 - 4-13)

   i. Water unit cost ($/1000 gal) ______________($1.22/1000 gal; p. 4-2)

   j. Water cost ($) [(Line 4a x Line 4h) ÷ 1000] x Line 4i ______________

   k. Fuel required for treatment (MMBtu/gal residue) ______________(pp. 4-12 - 4-13)

   l. Fuel unit cost ($/MMBtu) ______________(p. 4-2)

   m. Fuel cost ($) Line 4a x Line 4k x Line 4l ______________

   n. Labor required for treatment (hrs/gallon residue) ______________(pp. 4-12 - 4-13)

   o. Process operator unit labor cost ($/hr) ______________($26.50/hr; p. 9-3)

   p. Labor cost ($) Line 4a x Line 4n x Line 4o ______________

   q. On-site treatment cost ($) Line 4d + Line 4g + Line 4j + Line 4m + Line 4p ______________

   r. Residue generated from treatment (gal) ______________

WORKSHEET E-8 (page 3)

5. Treated Residue Discharge to Sewer

   a. Volume of liquid discharged (gal) ____________

   b. Sewer discharge unit cost ($/1000 gal) ____________ ($1.50/1000 gal; p. 4-2)

   c. Sewer discharge cost ($) (Line 5a ÷ 1000) x Line 5b ____________

6. Off-Site Management of Rubble, Decontamination Residue, and/or Treatment Residue

   a. Volume to be managed off-site (tons) ____________*

   b. Truck capacity (tons) ____________

   c. Number of loads Line 6a ÷ Line 6b (round up to nearest integer) ____________

   d. Transportation unit cost ($/mi) ____________ ($4.50/mi; p. 4-15)**

   e. One-way distance (mi/load) ____________

   f. Transportation cost ($) Line 6c x Line 6d x Line 6e ____________

   g. Off-site management unit cost ($/ton) ____________ (pp. 4-13 - 4-20)

   h. Off-site management cost ($) Line 6a x Line 6g ____________

   i. Off-site management subtotal ($) Line 6f + Line 6h ____________

7. On-Site Disposal

   Include volume on one or more worksheets:
   - Landfill Inventory - Line 1m, Line 1n, Line 1p
   - Incinerator Inventory - Line 1l, Line 1n
   - Land Treatment Inventory - Line 1k, Line 1o

8. Containment/Liner System Removal Subtotal ($) Line 1c + Line 2g + Line 3b + Line 4q + Line 5c + Line 6i ☐

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* Conversion factors are provided in the Volume III appendix.

** Based on a 250-mile one-way distance.

WORKSHEET E-9

Final Cover

1. Native Soil for Slope and Fill

   a. Length of area to be capped (yd) ____________

   b. Width of area to be capped (yd) ____________

   c. Quantity needed (yd^3) ____________(*)

   d. Excavation unit cost (\$/yd^3) ____________

   e. Placement and spreading unit cost (\$/yd^3) ____________(\$2.48/yd^3; p. 7-6)

   f. Compaction unit cost (\$/yd^3) ____________(\$2.25/yd^3; p. 7-6)

   g. Total native soil unit cost (\$/yd^3) Line 1d + Line 1e + Line 1f ____________(\$1.04/yd^3; p. 7-6)

   h. Percent compaction (decimal < 1) ____________(0.25; p. 7-10)

   i. Native soil cost (\$) Line 1c x Line 1g x (1 + Line 1h) ____________

2. On-Site Clay

   a. Area to be capped (yd^2) Line 1a x Line 1b ____________

   b. Depth of clay needed (yd) ____________

   c. Quantity needed (yd^3) Line 2a x Line 2b ____________

   d. Excavation unit cost (\$/yd^3) ____________(\$4.05/yd^3; p. 7-10)

   e. Placement/spreading unit cost (\$/yd^3) ____________(\$2.25/yd^3; p. 7-10)

   f. Compaction unit cost (\$/yd^3) ____________(\$2.41/yd^3; p. 7-10)

   g. Total on-site clay unit cost (\$/yd^3) Line 2d + Line 2e + Line 2f ____________(\$8.71/yd^3; pp. 7-10 - 7-11)

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* Formula provided in Final Cover and Revegetation chapter of Volume III.

WORKSHEET E-9 (page 2)

h. Percent compaction (decimal < 1) ______________ (0.25; p. 7-10)

i. Clay lift thickness (yd) ______________ (0.22 yd; p. 7-12)

j. Number of lifts
Line 2b ÷ Line 2i ______________

k. Number of samples to be tested/lift (samples/lift) ______________ (3 samples/lift; p. 7-12)

l. Number of samples to be tested
Line 2j x Line 2k ______________

m. Clay testing unit cost ($/sample) ______________ ($230/sample; p. 7-12)

n. Clay testing cost
Line 2l x Line 2m ______________

o. On-site clay cost ($)
Line 2c x Line 2g x (1 + Line 2h) + Line 2n ______________

3. Off-Site Clay

a. Area to be capped (yd^2)
Line 1a x Line 1b ______________

b. Depth of clay needed (yd) ______________ (0.67 yd; p. 7-4)

c. Quantity needed (yd^3)
Line 3a x Line 3b ______________

d. Purchase unit cost ($\$/yd^3$) ______________ ($\$4.75/yd^3$; p. 7-13)

e. Delivery unit cost ($\$/yd^3$) ______________ ($\$10.16/yd^3$; p. 7-13)

f. Spreading unit cost ($\$/yd^3$) ______________ ($\$1.03/yd^3$; p. 7-13)

g. Compaction unit cost ($\$/yd^3$) ______________ ($\$2.41/yd^3$; p. 7-13)

h. Total off-site clay unit cost ($\$/yd^3$)
Line 3d + Line 3e + Line 3f + Line 3g ______________ ($\$18.35/yd^3$; pp. 7-13 - 7-14)

i. Percent compaction (decimal < 1) ______________ (0.40; p. 7-10)

j. Clay lift thickness (yd) ______________ (0.22 yd; p. 7-12)

WORKSHEET E-9 (page 3)

k. Number of lifts
Line 3b ÷ Line 3j ______________

l. Number of samples to be
tested/lift (samples/lift) ______________(3 samples/lift; p. 7-12)

m. Number of samples to
be tested
Line 3k x Line 3l ______________

n. Clay testing unit cost
($/sample) ______________($230/sample; p. 7-12)

o. Clay testing cost
Line 3m x Line 3n ______________

p. Off-site clay cost ($)
Line 3c x Line 3h x (1 + Line 3i)
+ Line 3o ______________

4. Synthetic Membrane

a. Type of membrane ______________________________

b. Quantity needed (yd^2) ______________

c. Purchase unit cost ($/$yd^2$) ______________($2.60/yd^2; p. 7-16)

d. Delivery unit cost ($/$yd^2$) ______________($0.25/yd^2; p. 7-16)

e. Installation unit cost ($/$yd^2$) ______________($0.50/yd^2; p. 7-16)

f. Total synthetic membrane
unit cost ($/$yd^2$)
Line 4c + Line 4d + Line 4e ______________($3.35/$yd^2$; p. 7-16)

g. Synthetic liner testing
(percent of total synthetic
membrane unit cost) ______________(0.25; p. 7-15)

h. Synthetic membrane cost ($)
Line 4b x Line 4f x (1 +
Line 4g) ______________

5. Sand

a. Area to be capped (yd^2)
Line 1a x Line 1b ______________

b. Depth of sand needed (yd) ______________(0.33 yd; p. 7-4)

WORKSHEET E-9 (page 4)

c. Quantity needed (yd^3)
Line 5a x Line 5b ______________

d. Purchase unit cost ($\$/yd^3$) ______________ ($5.50/yd^3; p. 7-20)

e. Delivery unit cost ($\$/yd^3$) ______________ ($2.61/yd^3; p. 7-20)

f. Spreading unit cost ($\$/yd^3$) ______________ ($1.03/yd^3; p. 7-20)

g. Compaction unit cost ($\$/yd^3$) ______________ ($1.49/yd^3; p. 7-20)

h. Total sand unit cost ($\$/yd^3$)
Line 5d + Line 5e + Line 5f
+ Line 5g ______________ ($10.63/$yd^3$; pp. 7-20 - 7-21)

i. Percent compaction (decimal < 1) ______________ (0.10; p. 7-10)

j. Sand cost ($)
Line 5c x Line 5h x (1 + Line 5i) ______________

6. Gravel

a. Area to be capped (yd^2)
Line 1a x Line 1b ______________

b. Depth of gravel needed (yd) ______________ (0.33 yd; p. 7-4)

c. Quantity needed (yd^3)
Line 6a x Line 6b ______________

d. Purchase unit cost ($\$/yd^3$) ______________ ($3.85/yd^3; p. 7-17)

e. Delivery unit cost ($\$/yd^3$) ______________ ($2.61/yd^3; p. 7-17)

f. Spreading unit cost ($\$/yd^3$) ______________ ($1.03/yd^3; p. 7-17)

g. Compaction unit cost ($\$/yd^3$) ______________ ($1.22/yd^3; p. 7-17)

h. Total gravel unit cost ($\$/yd^3$)
Line 6d + Line 6e + Line 6f
+ Line 6g ______________ ($8.71/$yd^3$; pp. 7-17 - 7-18)

i. Percent compaction (decimal < 1) ______________ (0.05; p. 7-10)

j. Gravel cost ($)
Line 6c x Line 6h x (1 + Line 6i) ______________

WORKSHEET E-9 (page 5)

7. Drainage Tile

a. Type of tile ____________________

b. Length needed (L.F.) __________

c. Tile unit cost ($/L.F.) __________ ($0.50/L.F.; p. 7-22)

d. Trenching and backfilling unit cost ($/L.F.) __________ ($0.56/L.F.; p. 7-22)

e. Total drainage tile unit cost ($/L.F.)
Line 7c + Line 7d __________ ($1.06/L.F.; pp. 7-22 - 7-23)

f. Drainage tile cost ($)
Line 7b x Line 7e __________

8. Geotextile Filter Fabric

a. Type of geotextile ____________________

b. Quantity needed (yd^2) __________

c. Purchase unit cost ($\$/yd^2$) __________ ($\$0.69/yd^2$; p. 7-24)

d. Delivery unit cost ($\$/yd^2$) __________ ($\$0.05/yd^2$; p. 7-24)

e. Installation unit cost ($\$/yd^2$) __________ ($\$0.09/yd^2$; p. 7-24)

f. Total geotextile filter fabric unit cost ($\$/yd^2$)
Line 8c + Line 8d + Line 8e __________ ($\$0.83/yd^2$; p. 7-24)

g. Geotextile filter fabric cost ($)
Line 8b x Line 8f __________

9. Topsoil

a. Area to be capped (yd^2)
Line 1a x Line 1b __________

b. Depth of topsoil needed (yd) __________ (0.67 yd; p. 7-4)

c. Quantity needed (yd^3)
Line 9a x Line 9b __________

d. Purchase unit cost ($\$/yd^3$) __________ ($\$6.56/yd^3$; p. 7-26)

e. Delivery unit cost ($\$/yd^3$) __________ ($\$2.61/yd^3$; p. 7-26)

WORKSHEET E-9 (page 6)

f. Spreading unit cost ($\$/\mathrm{yd}^3$) __________ ($\$1.03/\mathrm{yd}^3$; p. 7-26)

g. Compaction unit cost ($\$/\mathrm{yd}^3$) __________ ($\$1.22/\mathrm{yd}^3$; p. 7-26)

h. Total topsoil unit cost ($\$/\mathrm{yd}^3$)
Line 9d + Line 9e + Line 9f +
Line 9g __________ ($\$11.42/\mathrm{yd}^3$; p. 7-26 - 7-27)

i. Percent compaction (decimal < 1) __________ (0.25; p. 7-10)

j. Topsoil cost (\$)
Line 9c x Line 9h x (1 + Line 9i) __________

10. Crushed Stone

a. Area to be capped (yd^2)
Line 1a x Line 1b __________

b. Depth of crushed stone needed (yd) __________ (0.33 yd; p. 7-4)

c. Quantity needed (yd^3)
Line 10a x Line 10b __________

d. Purchase unit cost ($\$/\mathrm{yd}^3$) __________ ($\$11.55/\mathrm{yd}^3$; p. 7-28)

e. Delivery unit cost ($\$/\mathrm{yd}^3$) __________ ($\$2.61/\mathrm{yd}^3$; p. 7-28)

f. Spreading unit cost ($\$/\mathrm{yd}^3$) __________ ($\$1.03/\mathrm{yd}^3$; p. 7-28)

g. Compaction unit cost ($\$/\mathrm{yd}^3$) __________ ($\$1.22/\mathrm{yd}^3$; p. 7-28)

h. Total crushed stone unit cost
($\$/\mathrm{yd}^3$)
Line 10d + Line 10e + Line 10f
+ Line 10g __________ ($\$16.41/\mathrm{yd}^3$; pp. 7-28 - 7-29)

i. Percent compaction (decimal < 1) __________ (0.05; p. 7-10)

j. Crushed stone cost (\$)
Line 10c x Line 10h x (1 + Line 10i) __________

11. Mobilization/Demobilization

a. Heavy equipment mobilization/
demobilization cost (\$) __________ (\$700; p. 7-32)

12. Final Cover Subtotal (\$)
Line 1i + Line 2o + Line 3p + Line 4h
+ Line 5j + Line 6j + Line 7f
+ Line 8g + Line 9j + Line 10j
+ Line 11a

WORKSHEET E-10

Revegetation

1. Soil Preparation and Grading
   - a. Area to be revegetated, including closed area that needs replanting (acres) ____________
   - b. Soil preparation and grading unit cost ($/acre) ____________ ($1002/acre; p. 7-31)
   - c. Soil preparation and grading cost ($) Line 1a x Line 1b ____________
2. Seeding
   - a. Type of vegetation ______________________
   - b. Seed unit cost ($/acre) ____________ ($795/acre; p. 7-31)
   - c. Seed cost ($) Line 1a x Line 2b ____________
3. Fertilizing
   - a. Type of fertilizer ______________________
   - b. Fertilizer unit cost ($/acre) ____________ ($176/acre; p. 7-31)
   - c. Fertilizing cost ($) Line 1a x Line 3b ____________
4. Mulching
   - a. Mulch unit cost ($/acre) ____________ ($1048/acre; p. 7-31)
   - b. Mulching cost ($) Line 1a x Line 4a ____________
5. Mobilization/Demobilization
   - a. Heavy equipment mobilization/demobilization cost ($) ____________ ($105; p. 7-32)
6. Revegetation Subtotal ($) Line 1c + Line 2c + Line 3c + Line 4b + Line 5a

WORKSHEET E-11

Certification of Partial Closures (if Applicable)

1. Independent Registered Professional Engineer

   a. Initial review of closure plan (hrs) ______________ (4 hrs; p. 8-4)

   b. Total number of inspections for all partial closures ______________

   c. Inspection time required (hrs/inspection) ______________ (p. 8-3)

   d. Inspection time required (hrs) Line 1b x Line 1c ______________

   e. Prepare final documentation (hrs) ______________ (4 hrs; p. 8-4)

   f. Total professional engineer time required (hrs) Line 1a + Line 1d + Line 1e ______________

   g. Professional engineer unit labor cost ($/hr) ______________ ($45.50/hr; p. 8-3)

   h. Professional engineer cost ($) Line 1f x Line 1g ______________

2. Clerical*

   a. Number of weeks for all partial closures ______________

   b. Clerical time required (hrs/wk) ______________ (2 hrs/wk; p. 8-3)

   c. Clerical unit labor cost ($/hr) ______________ ($18/hr; p. 8-3)

   d. Clerical cost ($) Line 2a x Line 2b x Line 2c ______________

3. Certification of Partial Closures Subtotal ($) Line 1h + Line 2d

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* Clerical time should be included only if the Professional Engineer is operating independently in a single-person business.

WORKSHEET E-12

Survey Plat - Partial Closures

1. Surveying of Waste Management Area Boundaries

    a. Number of separate partial closures ____________

    b. Land surveying team time required (hrs/partial closure) ____________

    c. Land surveying team unit labor cost ($/hr) ____________ ($75/hr; p. 9-3)

    d. Land surveying cost ($) Line 1a x Line 1b x Line 1c ____________

2. Fence Posts to Mark Boundaries

    a. Number of fence posts for all partial closures ____________

    b. Fence post unit cost ($/post) ____________ ($29/post; p. 3-7)

    c. Fence post cost ($) Line 2a x Line 2b ____________

3. Plat Submittal

    a. Attorney time required (hrs/partial closure) ____________

    b. Attorney unit labor cost ($/hr) ____________ ($100/hr; p. 9-3)

    c. Attorney cost ($) Line 1a x Line 3a x Line 3b ____________

    d. Clerical time required (hrs/partial closure) ____________

    e. Clerical unit labor cost ($/hr) ____________ ($18/hr; p. 9-3)

    f. Clerical cost ($) Line 1a x Line 3d x Line 3e ____________

    g. Plat submittal cost ($) Line 3c + Line 3f ____________

4. Notice to Local Land Authority Subtotal ($) Line 1d + Line 2c + Line 3g ☐

WORKSHEET E-13

Certification of Final Closure

1. Independent Registered Professional Engineer

   a. Initial review of closure plan (hrs) __________ (8 hrs; p. 8-4)

   b. Inspection frequency (inspections/wk) __________ (p. 8-3)

   c. Inspection time required (hrs/inspection) __________ (p. 8-3)

   d. Number of weeks for closure (wks) __________

   e. Inspection time required (hrs) Line 1b x Line 1c x Line 1d __________

   f. Prepare final documentation (hrs) __________ (4 hrs; p. 8-4)

   g. Total professional engineer time required (hrs) Line 1a + Line 1e + Line 1f __________

   h. Professional engineer unit labor cost ($/hr) __________ ($45.50/hr; p. 8-3)

   i. Professional engineer cost ($) Line 1g x Line 1h __________

2. Clerical*

   a. Clerical time required (hrs/wk) __________ (2 hrs/wk; p. 8-3)

   b. Clerical unit labor cost ($/hr) __________ ($18/hr; p. 8-3)

   c. Clerical cost ($) Line 1d x Line 2a x Line 2b __________

3. Certification of Closure Subtotal ($) Line 1i + Line 2c ☐

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* Clerical time should be included only if the Professional Engineer is operating independently in a single-person business.

WORKSHEET E-14

Survey Plat - Final Closure

1. Surveying of Waste Management Area Boundaries
   a. Land surveying team time required (hrs) __________
   b. Land surveying team unit labor cost ($/hr) __________ ($75/hr; p. 9-3)
   c. Land surveying cost ($) Line 1a x Line 1b __________
2. Fence Posts to Mark Boundaries
   a. Number of fence posts __________
   b. Fence post unit cost ($/post) __________ ($29/post; p. 3-7)
   c. Fence post cost ($) Line 2a x Line 2b __________
3. Plat Submittal
   a. Attorney time required (hrs) __________
   b. Attorney unit labor cost ($/hr) __________ ($100/hr; p. 9-3)
   c. Attorney cost ($) Line 3a x Line 3b __________
   d. Clerical time required (hrs) __________
   e. Clerical unit labor cost ($/hr) __________ ($18/hr; p. 9-3)
   f. Clerical cost ($) Line 3d x Line 3e __________
   g. Plat submittal cost ($) Line 3c + Line 3f __________
4. Notice to Local Land Authority Subtotal ($) Line 1c + Line 2c + Line 3g ☐

CHAPTER 4

LAND TREATMENT

This chapter contains the worksheets for estimating Part 264 or Part 265 closure costs for land treatment facilities. Worksheets F-1 through F-9 and F-11 through F-14 apply to all land treatment facilities. If no drainage channel repair is necessary, the user does not need to complete Worksheet F-6. Worksheet F-8 will be applicable if there is contaminated soil at the facility. The land treatment worksheets address the following items:

- Inventory Management
    1. Inventory quantity (maximum)
    2. On-site treatment of liquid waste inventory
    3. Treated waste discharge to sewer
    4. On-site landspreading/disking
    5. Containerization of bulk waste
    6. Container loading
    7. Off-site management of inventory and/or treatment residue
    8. On-site disposal

- Run-On/Run-Off Management
    1. Run-on/run-off collection
    2. On-site treatment of run-on/run-off
    3. Treated run-on/run-off discharge to sewer
    4. Off-site management of run-on/run-off and/or treatment residue
    5. Solidification prior to on-site landfill disposal
    6. On-site disposal

- Groundwater Monitoring - Part 264 Only

  1. Detection monitoring - background/upgradient wells
  2. Detection monitoring - compliance point/downgradient wells
  3. Compliance monitoring - background/upgradient wells
  4. Compliance monitoring - for selected hazardous constituents at compliance point/downgradient wells
  5. Compliance monitoring - for Appendix VIII constituents at compliance point/downgradient wells
  6. Administrative (reporting)
  7. Monitoring well maintenance and replacement

- Groundwater Monitoring - Part 265 Only

  1. Groundwater quality analysis
  2. Groundwater contamination analysis
  3. Administrative (reporting)
  4. Monitoring well maintenance and replacement

- Inspection and Repairs

  1. Inspection
  2. Fence installation or repair
  3. Other security equipment repair
  4. Wind dispersal structure repair

- Revegetation

  1. Soil preparation and grading
  2. Seeding
  3. Fertilizing
  4. Maintaining pH
  5. Mulching
  6. Mobilization/demobilization

- Repair of Drainage Channels

  1. Channel maintenance
  2. Revegetation of channel

- Soil Monitoring

  1. Soil core monitoring
  2. Soil-pore liquid monitoring
  3. Administrative (reporting)
  4. Monitoring equipment maintenance or replacement

- Testing for Soil Contamination

  1. Background samples and samples with potential contamination
  2. Preparation of isogram plan

- Decontamination

  1. Protective clothing and safety equipment for facility personnel
  2. Equipment decontamination
  3. Tank decontamination
  4. Pad or foundation decontamination
  5. Sump decontamination
  6. Container rinsing
  7. Other items needing decontamination
  8. On-site treatment of decontamination residues
  9. Testing for success of decontamination
  10. Treated residue discharge to sewer
  11. Off-site management of decontamination fluid/residue and/or treatment residue
  12. On-site disposal

- Removal of Contaminated Soil

  1. Protective clothing
  2. Excavation of contaminated soil and earthen berms
  3. Equipment decontamination
  4. On-site treatment of decontamination residues
  5. Treated residue discharge to sewer
  6. Off-site management of contaminated soil, decontamination residue, and/or treatment residue
  7. On-site disposal

- Certification of Partial Closures

  1. Independent registered professional engineer
  2. Independent qualified soil scientist (optional)
  3. Clerical

- Survey Plat - Partial Closures

  1. Surveying of waste management area boundaries
  2. Fence posts to mark boundaries
  3. Plat submittal

- Certification of Final Closure

  1. Independent registered professional engineer
  2. Independent qualified soil scientist (optional)
  3. Clerical

- Survey Plat - Final Closure

  1. Surveying of waste management area boundaries
  2. Fence posts to mark boundaries
  3. Plat submittal

WORKSHEET F-1

Inventory Management

1. Inventory Quantity (Maximum)*

   a. Inventory from land treatment storage waste pile(s) (tons) ______
   b. Inventory from land treatment storage tanks (tons) ______
   c. Inventory from other storage waste pile(s) (tons) ______
   d. Inventory from other storage tanks (tons) ______
   e. Inventory from containers (tons) ______
   f. Inventory from landfill (tons) ______
   g. Inventory from incineration (tons) ______
   h. Leachate and/or run-off from surface impoundment(s) (tons) ______
   i. Sludge/residue from surface impoundment(s) (tons) ______
   j. Free liquid from surface impoundment(s) (tons) ______
   k. Decontamination fluid/residue (tons) ______
   l. Contaminated soil (tons) ______
   m. Leachate and/or run-off from waste pile(s) (tons) ______
   n. Leachate and/or run-off from landfill (tons) ______
   o. Residues from treatment of waste inventory, decontamination fluid, and/or leachate (tons) ______
   p. Run-on/run-off from land treatment (tons) ______
   q. Other (tons) ______

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* Conversion factors are provided in the Volume III appendix.

WORKSHEET F-1 (page 2)

r. Total inventory (tons)
Line 1a + Line 1b + Line 1c +
Line 1d + Line 1e + Line 1f +
Line 1g + Line 1h + Line 1i +
Line 1j + Line 1k + Line 1l +
Line 1m + Line 1n + Line 1o +
Line 1p + Line 1q ______________

2. On-Site Treatment of Liquid Waste Inventory

a. Quantity of waste to be treated (gal) ______________

b. Chemicals required for treatment (lb/gal waste or gal/gal waste) ______________(pp. 4-12 - 4-13)

c. Chemicals unit cost ($/lb or $/gal) ______________

d. Chemicals cost ($)
Line 2a x Line 2b x Line 2c ______________

e. Electricity required for treatment (kwh/gal waste) ______________(pp. 4-12 - 4-13)

f. Electricity unit cost ($/kwh) ______________($0.05/kwh; p. 4-2)

g. Electricity cost ($)
Line 2a x Line 2e x Line 2f ______________

h. Water required for treatment (gal/gal waste) ______________(pp. 4-12 - 4-13)

i. Water unit cost ($/1000 gal) ______________($1.22/1000 gal; p. 4-2)

j. Water cost ($)
[(Line 2a x Line 2h) ÷ 1000] x Line 2i ______________

k. Fuel required for treatment (MMBtu/gal waste) ______________(pp. 4-12 - 4-13)

l. Fuel unit cost ($/MMBtu) ______________(p. 4-2)

m. Fuel cost ($)
Line 2a x Line 2k x Line 2l ______________

n. Labor required for treatment (hrs/gallon waste) ______________(pp. 4-12 - 4-13)

o. Process operator unit labor cost ($/hr) ______________($26.50/hr; p. 9-3)

WORKSHEET F-1 (page 3)

p. Labor cost ($)
Line 2a x Line 2n x Line 2o ______________

q. On-site treatment cost ($)
Line 2d + Line 2g + Line 2j +
Line 2m + Line 2p ______________

r. Residue generated from treatment
(gal) ______________

3. Treated Waste Discharge to Sewer

a. Volume of liquid discharged (gal) ______________

b. Sewer discharge unit cost
($/1000 gal) ______________ ($1.50/1000 gal;
p. 4-2)

c. Sewer discharge cost ($)
(Line 3a ÷ 1000) x Line 3b ______________

4. On-Site Landspreading/Disking

a. Quantity of inventory landspread
(tons) ______________

b. Application rate (tons/acre) ______________

c. Land area required (acres)
Line 4a ÷ Line 4b ______________

d. Landspreading unit cost
($/ton) ______________ (p. 4-11)

e. Landspreading cost ($)
Line 4a x Line 4d ______________

f. Lime unit cost ($/acre) ______________ ($214/acre; p. 4-11)

g. Lime cost ($)
Line 4c x Line 4f ______________

h. Mobilization/demobilization
cost ($) ______________ (p. 4-11)

i. Frequency that periodic disking is
needed (number of times during
closure) ______________

j. Disking unit cost ($/acre) ______________ ($14.40/acre; p. 4-12)

k. Disking cost ($)
Line 4c x Line 4i x Line 4j ______________

WORKSHEET F-1 (page 4)

l. Total on-site landspreading cost ($)
Line 4e + Line 4g + Line 4h + Line 4k ____________

5. Containerization of Bulk Waste

a. Quantity of waste to be containerized (gal) ____________*

b. Container capacity (gal/container) ____________(55 gal/container; p. 4-6)

c. Number of containers needed
Line 5a ÷ Line 5b ____________

d. Containerization unit cost ($/container) ____________(p. 4-6 and 4-8)

e. Containerization cost ($)
Line 5c x Line 5d ____________

6. Container Loading

a. Number of pallets
Line 5c ÷ 4
(round up to nearest integer) ____________

b. Loading unit cost ($/pallet) ____________($4.66/pallet; p. 4-8)

c. Container loading cost ($)
Line 6a x Line 6b ____________

7. Off-Site Management of Inventory and/or Treatment Residue

a. Quantity to be managed off-site (tons) ____________*

b. Off-site management method ________________

c. Transportation unit cost ($/mi) ____________($4.50/mi; p. 4-15)**

d. One-way travel distance (mi/load) ____________

e. Truck capacity (tons) ____________

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* Conversion factors are provided in the Volume III appendix.

** Based on a 250-mile one-way distance.

WORKSHEET F-1 (page 5)

f. Number of loads
Line 7a ÷ Line 7e
(round up to nearest integer) __________

g. Transportation cost ($)
Line 7c x Line 7d x Line 7f __________

h. Off-site management unit cost
($/ton) __________ (pp. 4-13 - 4-20)

i. Off-site management cost ($)
Line 7g + (Line 7a x Line 7h) __________

8. On-Site Disposal

Include volume on one or more worksheets:
Landfill Inventory - Line 1
Incinerator Inventory - Line 1

9. Land Treatment Inventory Management
Subtotal ($)
Line 2q + Line 3c + Line 41 + Line 5e +
Line 6c + Line 7i ☐

WORKSHEET F-2

Run-On/Run-Off Management

1. Run-On/Run-Off Collection

    a. Run-on/run-off volume collected during closure (gal) ______________

    b. Time required for pumping (hrs) Line 1a ÷ 8000 (round up to nearest integer) ______________

    c. Pumping unit cost ($/hr) ______________ ($23/hr; p. 4-11)

    d. Pump rental cost, optional ($/hr) ______________ ($2.70/hr; p. 4-11)

    e. Pumping cost ($) Line 1b x (Line 1c + Line 1d) ______________

2. On-Site Treatment of Run-On/Run-Off

    a. Quantity of run-on/run-off to be treated (gal) ______________

    b. Chemicals required for treatment (lb/gal run-on/run-off or gal/gal run-on/run-off) ______________ (pp. 4-12 - 4-13)

    c. Chemicals unit cost ($/lb or $/gal) ______________

    d. Chemicals cost ($) Line 2a x Line 2b x Line 2c ______________

    e. Electricity required for treatment (kwh/gal run-on/run-off) ______________ (pp. 4-12 - 4-13)

    f. Electricity unit cost ($/kwh) ______________ ($0.05/kwh; p. 4-2)

    g. Electricity cost ($) Line 2a x Line 2e x Line 2f ______________

    h. Water required for treatment (gal/gal run-on/run-off) ______________ (pp. 4-12 - 4-13)

    i. Water unit cost ($/1000 gal) ______________ ($1.22/1000 gal; p. 4-2)

    j. Water cost ($) [(Line 2a x Line 2h) ÷ 1000] x Line 2i ______________

    k. Fuel required for treatment (MMBtu/gal run-on/run-off) ______________ (pp. 4-12 - 4-13)

WORKSHEET F-2 (page 2)

l. Fuel unit cost ($MMBtu) ______________ (p. 4-2)

m. Fuel cost ($)
Line 2a x Line 2k x Line 2l ______________

n. Labor required for treatment
(hrs/gallon run-on/run-off) ______________ (pp. 4-12 - 4-13)

o. Process operator unit labor
cost ($/hr) ______________ ($26.50/hr; p. 9-3)

p. Labor cost ($)
Line 2a x Line 2n x Line 2o ______________

q. On-site treatment cost ($)
Line 2d + Line 2g + Line 2j +
Line 2m + Line 2p ______________

r. Residue generated from treatment
(gal) ______________

3. Treated Run-On/Run-Off Discharge to Sewer

a. Quantity discharged (gal) ______________

b. Sewer discharge unit cost
($/1000 gal) ______________ ($1.50/1000 gal;
p. 4-2)

c. Sewer discharge cost ($)
(Line 3a ÷ 1000) x Line 3b ______________

4. Off-Site Management of Run-On/Run-Off
and/or Treatment Residue

a. Amount to be managed off-site (tons) ______________*

b. Truck capacity (tons) ______________

c. Number of loads
Line 4a ÷ Line 4b
(round up to nearest integer) ______________

d. One-way distance (mi/load) ______________

e. Transportation unit cost ($/mi) ______________ ($4.50/mi; p. 4-15)**

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* Conversion factors are provided in the Volume III appendix.

** Based on a 250-mile one-way distance.

WORKSHEET F-2 (page 3)

f. Transportation cost ($)
Line 4c x Line 4d x Line 4e ____________

g. Off-site management unit cost
($/ton) ____________(pp. 4-16 - 4-20)

h. Off-site management cost ($)
Line 4a x Line 4g ____________

i. Off-site management subtotal ($)
Line 4f + Line 4h ____________

5. Solidification Prior to On-Site Landfill Disposal

a. Quantity to be solidified (tons) ____________*

b. Type of solidification material________________

c. Solidification unit cost ($/ton) ____________(p. 4-11)

d. Solidification cost ($)
Line 5a x Line 5c ____________

e. Change in waste quantity
(factor $\geq$ 1) ____________(1.0; p. 4-11)

f. Final solidified wate
quantity (tons)
Line 5a x (1 + Line 5e) ____________

6. On-Site Disposal

Include volume on one or more worksheets:
Landfill Inventory - Line 1p, Line 1r
Incinerator Inventory - Line 1n, Line 1q
Land Treatment Inventory - Line 1o, Line 1p

7. Run-On/Run-Off Management
Subtotal ($)
Line 1e + Line 2q + Line 3c +
Line 4i + Line 5d ☐

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* Conversion factors are provided in the Volume III appendix.

WORKSHEET F-3, PART 264 ONLY

Groundwater Monitoring

1. Detection Monitoring - Background/Upgradient Wells (continuation of monitoring program from operating period)

    a. Number of wells __________

    b. Number of samples collected per well (samples/well) __________

    c. Number of replicate analyses per sample (replicates/sample) __________

    d. Number of analyses Line 1a x Line 1b x Line 1c __________(minimum of 4)

    e. Sample collection and preparation time required (hrs/well) __________(4 hrs/well; p. 2-9)

    f. Transportation time to and from site (hrs) __________

    g. Contract lab technician unit labor cost ($/hr) __________($20.50/hr; p. 9-3)

    h. Sample collection time (hrs) (Line 1a x Line 1e) + Line 1f __________

    i. Sampling cost ($) Line 1g x Line 1h __________

    j. Contract lab fee ($/analysis) __________(p. 2-10)

    k. Contract lab cost ($) Line 1d x Line 1j __________

    l. Number of times upgradient detection monitoring samples are collected during closure __________(quarterly for one year; p. 2-3)

    m. Upgradient/background detection monitoring cost ($) (Line 1i + Line 1k) x Line 1l __________

WORKSHEET F-3, PART 264 ONLY (page 2)

2. Detection Monitoring - Compliance Point/Downgradient Wells (continuation of monitoring program from operating period)

   a. Number of wells ________________

   b. Number of samples collected per well (samples/well) ________________

   c. Number of replicate analyses per sample (replicates/sample) ________________

   d. Number of analyses Line 2a x Line 2b x Line 2c ________________

   e. Sample collection and preparation time required (hrs/well) ________________(4 hrs/well; p. 2-9)

   f. Transportation time to and from site (hrs) ________________

   g. Contract lab technician unit labor cost ($/hr) ________________($20.50/hr; p. 9-3)

   h. Sample collection time (hrs) (Line 2a x Line 2e) + Line 2f ________________

   i. Sampling cost ($) Line 2g x Line 2h ________________

   j. Contract lab fee ($/analysis) ________________(p. 2-10)

   k. Contract lab cost ($) Line 2d x Line 2j ________________

   l. Number of times downgradient detection monitoring samples are collected during closure ________________(twice/year; p. 2-3)

   m. Downgradient/compliance point detection monitoring cost ($) (Line 2i + Line 2k) x Line 2l ________________

3. Compliance Monitoring - Background/Upgradient Wells (continuation of monitoring program from operating period)

   a. Number of wells ________________

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b. Number of samples collected per well (samples/well) ______________

c. Number of replicate analyses per sample (replicates/sample) ______________

d. Number of analyses Line 3a x Line 3b x Line 3c ______________(minimum of 4)

e. Sample collection and preparation time required (hrs/well) ______________(4 hrs/well; p. 2-9)

f. Transportation time to and from site (hrs) ______________

g. Contract lab technician unit labor cost ($/hr) ______________($20.50/hr; p. 9-3)

h. Sample collection time (hrs) (Line 3a x Line 3e) + Line 3f ______________

i. Sampling cost ($) Line 3g x Line 3h ______________

j. Contract lab fee ($/analysis) ______________(p. 2-10)

k. Contract lab cost ($) Line 3d x Line 3j ______________

l. Number of times upgradient compliance monitoring samples are collected during closure ______________(quarterly for one year; p. 2-4)

m. Upgradient/background compliance monitoring cost ($) (Line 3i + Line 3k) x Line 3l ______________

4. Compliance Monitoring - for Selected Hazardous Constituents at Compliance Point/Downgradient Wells (continuation of monitoring program from operating period)

a. Number of wells ______________

b. Number of samples collected per well (samples/well) ______________

c. Number of replicate analyses per sample (replicates/sample) ______________

WORKSHEET F-3, PART 264 ONLY (page 4)

d. Number of analyses Line 4a x Line 4b x Line 4c _____

e. Sample collection and preparation time required (hrs/well) _____(4 hrs/well; p. 2-9)

f. Transportation time to and from site (hrs) _____

g. Contract lab technician unit labor cost ($/hr) _____($20.50/hr; p. 9-3)

h. Sample collection time (hrs) (Line 4a x Line 4e) + Line 4f _____

i. Sampling cost ($) Line 4g x Line 4h _____

j. Contract lab fee ($/analysis) _____(p. 2-10)

k. Contract lab cost ($) Line 4d x Line 4j _____

l. Number of times downgradient hazardous constituent compliance monitoring samples are collected during closure _____(quarterly; p. 2-4)

m. Downgradient hazardous constituent compliance monitoring cost ($) (Line 4i + Line 4k) x Line 4l _____

5. Compliance Monitoring - for Appendix VIII Constituents at Compliance Point/Downgradient Wells (continuation of monitoring program from operating period)

a. Number of wells _____

b. Number of samples collected per well (samples/well) _____

c. Number of replicate analyses per sample (replicates/sample) _____

d. Number of analyses Line 5a x Line 5b x Line 5c _____

e. Sample collection and preparation time required (hrs/well) _____(4 hrs/well; p. 2-9)

WORKSHEET F-3, PART 264 ONLY (page 5)

f. Transportation time to and from site (hrs) ________

g. Contract lab technician unit labor costs ($/hr) ________ ($20.50/hr; p. 9-3)

h. Sample collection time (hrs) (Line 5a x Line 5e) + Line 5f ________

i. Sampling cost ($) Line 5g x Line 5h ________

j. Contract lab fee ($/analysis) ________ (p. 2-10)

k. Contract lab cost ($) Line 5d x Line 5j ________

l. Number of times downgradient Appendix VIII compliance monitoring samples are collected during closure ________ (annually; p. 2-4)

m. Downgradient Appendix VIII constituents compliance monitoring cost ($) (Line 5i + Line 5k) x Line 4l ________

6. Administrative (Reporting)

a. Number of analyses
(Line 1d x Line 1l) +
(Line 2d x Line 2l) +
(Line 3d x Line 3l) +
(Line 4d x Line 4l) +
(Line 5d x Line 5l) ________

b. Contract lab technician time required (hrs/analysis) ________

c. Contract lab technician unit labor cost ($/hr) ________ ($20.50/hr; p. 9-3)

d. Technician cost ($) Line 6a x Line 6b x Line 6c ________

e. Clerical time required (hrs/analysis) ________

f. Clerical unit labor cost ($/hr) ________ ($18/hr; p. 9-3)

g. Clerical cost ($) Line 6a x Line 6e x Line 6f ________

h. Administration subtotal ($) Line 6d + Line 6g ________

WORKSHEET F-3, PART 264 ONLY (page 6)

7. Monitoring Well Maintenance and Replacement

a. Total number of wells ______________

b. Maintenance time required (hrs/well) ______________

c. Unit labor cost ($/hr) ______________($23/hr; p. 9-3)

d. Monitoring well maintenance cost ($)
Line 7a x Line 7b x Line 7c ______________

e. Number of wells needing replacement ______________

f. Existing monitoring well sealing unit cost ($/well) ______________($300/well; p. 3-5)*

g. New monitoring well construction unit cost ($/well) ______________($4125/well; p. 3-5)*

h. Mobilization/demobilization ($) ______________($150; p. 3-5)

i. Monitoring well replacement cost ($)
[Line 7e x (Line 7f + Line 7g)] + Line 7h ______________

j. Number of pumps needing replacement ______________(p. 3-5)

k. Pump unit cost ($/pump) ______________

l. Pump cost ($)
Line 7j x Line 7k ______________

m. Number of wells needing tubing replacement ______________

n. Length of tubing (ft/well) ______________

o. Tubing unit cost ($/ft) ______________(p. 3-5)

p. Tubing replacement cost ($)
Line 7m x Line 7n x Line 7o ______________

q. Number of wells needing cap replacement ______________

r. Well cap unit cost ($/cap) ______________

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* Based on a depth of 100 vertical lineal feet.

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s. Well cap replacement cost ($)
Line 7q x Line 7r ______________

t. Monitoring well maintenance and
replacement cost ($)
Line 7d + Line 7h + Line 7i +
Line 7l + Line 7p + Line 7s ______________

8. Groundwater Monitoring Subtotal ($)
Line 1m + Line 2m + Line 3m +
Line 4m + Line 5m + Line 6h + Line 7t ☐

WORKSHEET F-3, PART 265 ONLY

Groundwater Monitoring

1. Groundwater Quality Analysis

   a. Number of wells ______________ (minimum of 4; p. 2-1)

   b. Number of samples collected per well (samples/well) ______________

   c. Number of replicate analyses per sample (replicates/sample) ______________

   d. Number of analyses Line 1a x Line 1b x Line 1c ______________

   e. Sample collection and preparation time required (hrs/well) ______________ (4 hrs/well; p. 2-4)

   f. Transportation time to and from site (hrs) ______________

   g. Contract lab technician unit labor cost ($/hr) ______________ ($20.50/hr; p. 9-3)

   h. Sample collection time (hrs) (Line 1a x Line 1e) + Line 1f ______________

   i. Sampling cost ($) Line 1g x Line 1h ______________

   j. Contract lab fee ($/analysis) ______________ ($85/analysis; p. 2-5)

   k. Contract lab cost ($) Line 1d x Line 1j ______________

   l. Number of times groundwater quality samples are collected during closure ______________

   m. Groundwater quality sampling cost ($) (Line 1i + Line 1k) x Line 1l ______________

2. Groundwater Contamination Analysis

   a. Number of wells ______________ (minimum of 4; p. 2-1)

   b. Number of samples collected per well (samples/well) ______________

WORKSHEET F-3, PART 265 ONLY (page 2)

c. Number of replicate analyses per sample (replicates/sample) ______________ (4 replicates/sample; p. 2-2)

d. Number of analyses Line 2a x Line 2b x Line 2c ______________

e. Sample collection and preparation time required (hrs/well) ______________ (4 hrs/well; p. 2-6)

f. Transportation time to and from site (hrs) ______________

g. Contract lab technician unit labor cost ($/hr) ______________ ($20.50/hr; p. 9-3)

h. Sample collection time (hrs) (Line 2a x Line 2e) + Line 2f ______________

i. Sampling cost ($) Line 2g x Line 2h ______________

j. Contract lab fee ($/analysis) ______________ ($120/analysis; p. 2-7)

k. Contract lab cost ($) Line 2d x Line 2j ______________

l. Number of times groundwater contamination samples are collected during closure ______________

m. Groundwater contamination sampling cost ($) (Line 2i + Line 2k) x Line 2l ______________

3. Administrative (Reporting)

a. Total number of analyses (Line 1d x Line 1l) + (Line 2d x Line 2l) ______________

b. Contract lab technician time required (hrs/analysis) ______________

c. Technician unit labor cost ($/hr) ______________ ($20.50/hr; p. 9-3)

d. Technician cost ($) Line 3a x Line 3b x Line 3c ______________

e. Clerical time required (hrs/set of analysis) ______________

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f. Clerical unit labor cost ($/hr) ______________ ($18/hr; p. 9-3)

g. Clerical cost ($)
Line 3a x Line 3e x Line 3f ______________

h. Administration subtotal ($)
Line 3d + Line 3g ______________

4. Monitoring Well Maintenance and Replacement

a. Total number of wells ______________

b. Maintenance time required (hrs/well) ______________

c. Unit labor cost ($/hr) ______________ ($23/hr; p. 9-3)

d. Monitoring well maintenance cost ($)
Line 4a x Line 4b x Line 4c ______________

e. Number of wells needing replacement ______________

f. Existing monitoring well sealing unit cost ($/well) ______________ ($300/well; p. 3-5)*

g. New monitoring well construction unit cost ($/well) ______________ ($4125/well; p. 3-5)*

h. Mobilization/demobilization ($) ______________ ($150; p. 3-5)

i. Monitoring well replacement cost ($)
[Line 4e x (Line 4f + Line 4g)] + Line 4h ______________

j. Number of pumps needing replacement ______________ (p. 3-5)

k. Pump unit cost ($/pump) ______________

l. Pump cost ($)
Line 4j x Line 4k ______________

m. Number of wells needing tubing replacement ______________

n. Length of tubing (ft/well) ______________

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* Based on a depth of 100 vertical lineal feet.

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o. Tubing unit cost ($/ft) ________ (p. 3-5)

p. Tubing replacement cost ($)
Line 4m x Line 4n x Line 4o ________

q. Number of wells needing cap replacement ________

r. Well cap unit cost ($/cap) ________

s. Well cap replacement cost ([illegible]
Line 4q x Line 4r ________

t. Monitoring well maintenance and replacement cost ($)
Line 4d + Line 4h + Line 4i +
Line 4l + Line 4p + Line 4s ________

5. Groundwater Monitoring Subtotal ($)
Line 1m + Line 2m + Line 3h + Line 4t ☐

WORKSHEET F-4

Inspection and Repairs

1. Inspection

   a. Time required for inspection by technician (hrs) ______________

   b. Technician unit labor cost ($/hr) ______________($20.50/hr; p. 9-3)

   c. Technician cost ($) Line 1a x Line 1b ______________

   d. Engineer time required (hrs) ______________

   e. Engineer unit labor cost ($/hr) ______________($45.50/hr; p. 9-3)

   f. Engineer cost ($) Line 1d x Line 1e ______________

   g. Clerical time required (hrs) ______________

   h. Clerical unit labor cost ($/hr) ______________($18/hr; p. 9-3)

   i. Clerical cost ($) Line 1g x Line 1h ______________

   j. Inspection subtotal ($) Line 1c + Line 1f + Line 1i ______________

2. Fence Installation or Repair

   a. Amount of fence to be installed or replaced (L.F.) ______________

   b. Fencing unit cost ($/L.F.) ______________($10.55/L.F.; p. 3-8)

   c. Fence cost ($) Line 2a x Line 2b ______________

   d. Number of gates needed ______________

   e. Gate unit cost ($/gate) ______________($80/gate; p. 3-8)

   f. Gate cost ($) Line 2d x Line 2e ______________

   g. Number of fence posts needed ______________

   h. Fence post unit cost ($/post) ______________($57/post; p. 3-8)

   i. Fence post cost ($) Line 2g x Line 2h ______________

WORKSHEET F-4 (page 2)

j. Fence installation/repair cost ($)
Line 2c + Line 2f + Line 2i ____________

3. Other Security Equipment Repair

a. Types of equipment needing
repair or replacement ____________________________

b. Number of items needing
replacement ____________

c. Replacement unit cost ($/item) ____________(p. 3-8)

d. Security equipment replacement
cost ($)
Line 3b x Line 3c ____________

4. Wind Dispersal Structure Repair

a. Number of trees to be replaced ____________

b. Tree unit cost ($/tree) ____________($140/tree; p. 3-7)

c. Tree cost ($)
Line 4a x Line 4b ____________

d. Amount of screen to be
installed or replaced (L.F.) ____________

e. Screen unit cost ($/L.F.) ____________($2.76/L.F.; p. 3-7)

f. Screen cost ($)
Line 4d x Line 4e ____________

g. Wind dispersal structure repair
cost
Line 4c + Line 4f ____________

5. Inspection and Repair Subtotal ($)
Line 1j + Line 2j + Line 3d + Line 4g ☐

WORKSHEET F-5

Revegetation

1. Soil Preparation and Grading

   a. Area to be revegetated, including closed area that needs replanting (acres) ________________

   b. Soil preparation and grading unit cost ($/acre) ________________($1002/acre; 7-31)

   c. Soil preparation and grading cost ($) Line 1a x Line 1b ________________

2. Seeding

   a. Type of vegetation________________________________

   b. Seed unit cost ($/acre) ________________($795/acre; p. 7-31)

   c. Seed cost ($) Line 1a x Line 2b ________________

3. Fertilizing

   a. Type of fertilizer________________________________

   b. Fertilizer unit cost ($/acre) ________________($176/acre; p. 7-31)

   c. Fertilizing cost ($) Line 1a x Line 3b ________________

4. Maintaining pH

   a. pH maintenance frequency ________________

   b. Land treatment area (acres/visit) ________________

   c. Lime unit cost - initial application ($/acre) ________________($214/acre; p. 3-13)

WORKSHEET F-5 (page 2)

d. Lime cost - initial application ($)
Line 4b x Line 4c ______

e. Lime unit cost - supplementary applications ($/acre) ______ ($60/acre; p. 3-13)

f. Lime cost - supplementary applications ($)
Line 4a x Line 4b x Line 4e ______

g. pH maintenance cost ($)
[(Line 4a + 1) x Line 4i] + Line 4d + Line 4f ______

5. Mulching

a. Mulch unit cost ($/acre) ______ ($1048/acre; p. 7-31)

b. Mulching cost ($)
Line 1a x Line 5a ______

6. Mobilization/Demobilization

a. Heavy equipment mobilization demobilization cost ($) ______ ($105; p. 7-32)

7. Revegetation Subtotal ($)
Line 1c + Line 2c + Line 3c + Line 4g + Line 5b + Line 6a ______

WORKSHEET F-6

Repair of Drainage Channels

1. Channel Maintenance
   - a. Surface area of channel to be repaired (yd^2) ____________
   - b. Hand grading unit cost ($/$yd^2$) ____________ ($2.46/yd^2; p. 3-2)
   - c. Grading cost ($) Line 1a x Line 1b ____________
2. Revegetation of Channel
   - a. Area to be seeded, fertilized, and mulched (acres) ____________
   - b. Seed unit cost ($/acre) ____________ ($1334/acre; pp. 3-2, 3-11)
   - c. Seed cost ($) Line 2a x Line 2b ____________
   - d. Fertilizer unit cost ($/acre) ____________ ($290 acre; pp. 3-2, 3-11)
   - e. Fertilizer cost ($) Line 2a x Line 2d ____________
   - f. Mulch unit cost ($/acre) ____________ ($2904/acre; pp. 3-2, 3-11)
   - g. Mulch cost ($) Line 2a x Line 2f ____________
   - h. Revegetation cost ($) Line 2c + Line 2e + Line 2g ____________
3. Repair of Drainage Channels Subtotal ($) Line 1c + Line 2h ☐

WORKSHEET F-7

Soil Monitoring

1. Soil Core Monitoring

   a. Number of samples ______________

   b. Sample collection time required (hrs/sample) ______________ (1 hr/sample; p. 2-12)

   c. Transportation time to and from site (hrs) ______________

   d. Contract lab technician unit labor cost ($/hr) ______________ ($20.50/hr; p. 9-3)

   e. Sample collection time (hrs) (Line 1a x Line 1b) + Line 1c ______________

   f. Sampling cost ($) Line 1d x Line 1e ______________

   g. Contract lab fee ($/sample) ______________ (p. 2-13)

   h. Contract lab cost ($) Line 1a x Line 1g ______________

   i. Number of times soil core samples are collected during closure ______________

   j. Soil core monitoring cost ($) (Line 1f + Line 1h) x Line 1i ______________

2. Soil-Pore Liquid Monitoring

   a. Number of samples ______________

   b. Sample collection time required (hrs/sample) ______________ (1 hr/sample; p. 2-14)

   c. Transportation time to and from site (hrs) ______________

   d. Contract lab technician unit labor cost ($/hr) ______________ ($20.50/hr; p. 9-3)

   e. Sample collection time (hrs) (Line 2a x Line 2b) + Line 2c ______________

   f. Sampling cost ($) Line 2d x Line 2e ______________

WORKSHEET F-7 (page 2)

g. Contract lab fee ($/sample) ____________ (p. 2-15)

h. Contract lab cost ($)
Line 2a x Line 2g ____________

i. Number of times soil-pore liquid samples are collected during closure ____________

j. Soil-pore liquid analysis cost ($)
(Line 2f + Line 2h) x Line 2i ____________

3. Administrative (Reporting)

a. Total number of samples
(Line 1a x Line 1i) + (Line 2a x Line 2i) ____________

b. Contract lab technician time required (hrs/sample) ____________

c. Technician unit labor cost ($) ____________ ($20.50/hr; p. 9-3)

d. Technician cost ($)
Line 3a x Line 3b x Line 3c ____________

e. Clerical time required (hrs/sample) ____________

f. Clerical unit labor cost ($/hr) ____________ ($18/hr; p. 9-3)

g. Clerical cost ($)
Line 3a x Line 3e x Line 3f ____________

h. Administrative subtotal ($)
Line 3d + Line 3g ____________

4. Monitoring Equipment Maintenance or Replacement

a. Number of lysimeters ____________

b. Maintenance time required (hrs/lysimeter) ____________

c. Unit labor cost ($/hr) ____________ ($23/hr; p. 9-3)

d. Lysimeter Maintenance cost ($)
Line 4a x Line 4b x Line 4c ____________

e. Number of lysimeters needing replacement ____________

WORKSHEET F-7 (page 3)

f. Lysimeter unit cost ($/lysimeter) ____________ ($131.80/lysimeter; p. 3-5)

g. Lysimeter replacement cost ($) Line 4e x Line 4f ____________

h. Time required for technician to travel to and from site for lysimeter replacement (hrs) ____________

i. Travel unit cost ($/hr) ____________ ($85/hr; p. 3-5)

j. Travel cost ($) Line 4h x Line 4i ____________

k. Monitoring equipment maintenance/replacement cost ($) Line 4d + Line 4g + Line 4j ____________

5. Soil Monitoring Subtotal ($) Line 1j + Line 2j + Line 3h + Line 4k ☐

WORKSHEET F-8

Testing for Soil Contamination

1. Background Samples and Samples with Potential Contamination
   - a. Number of soil samples to be taken ____________
   - b. Number of samples requiring coring through concrete/asphalt foundations/pads ____________
   - c. Thickness of foundation/pad (inches) ____________
   - d. Unit cost for coring through/removing concrete/asphalt foundations/pads ($/sample) ____________ ($15/inch; p. 6-1)
   - e. Sample collection time required (hrs/sample) ____________ (1 hr/sample; p. 2-12)
   - f. Transportation time to and from site (hrs) ____________
   - g. Contract lab technician unit labor cost ($/hr) ____________ ($20.50/hr; p. 9-3)
   - h. Sample collection time (hrs) (Line 1a x Line 1e) + Line 1f ____________
   - i. Sampling cost ($) (Line 1b x Line 1c x Line 1d (Line 1g x Line 1h) ____________
   - j. Contract lab fee ($/sample) ____________ (p. 2-13)
   - k. Contract lab cost ($) Line 1a x Line 1j ____________
   - l. Sample cost ($) Line 1i + Line 1k ____________

2. Preparation of Isogram Plan
   - a. Engineer time required (hrs) ____________
   - b. Engineer unit labor cost ($/hr) ____________ ($45.50/hr; p. 9-3)
   - c. Engineer cost ($) Line 2a x Line 2b ____________
   - d. Draftsperson time required (hrs) ____________
   - e. Draftsperson unit labor cost ($/hr) ____________ ($24/hr; p. 9-3)

WORKSHEET F-8 (page 2)

f. Draftsperson cost ($)
Line 2d x Line 2e ______________

g. Clerical time required (hrs) ______________

h. Clerical unit labor cost ($/hr) ______________($18/hr; p. 9-3)

i. Clerical cost ($)
Line 2g x Line 2h ______________

j. Isogram plan cost ($)
Line 2c + Line 2f + Line 2i ______________

3. Soil Testing Subtotal ($)
Line 1l + Line 2j ☐

WORKSHEET F-9

Decontamination

1. Protective Clothing and Safety Equipment for Facility Personnel

   a. Number of personnel requiring protective clothing and safety equipment for decontamination __________

   b. Safety equipment and protective clothing unit cost ($/person) __________ ($80/person; p. 5-6)

   c. Safety equipment and protective clothing cost ($) Line 1a x Line 1b __________

2. Equipment Decontamination

   a. Equipment needing decontamination:

      - pumps and feed lines
      - heavy equipment (e.g., fork lifts, dozers, etc.)
      - other equipment (list)__________________________

        ____

   b. Number of pumps and lines __________

   c. Pumps and lines decontamination cost ($) __________(p. 5-4)

   d. Residual generation rate for pump and line decontamination __________(50 gal/pump and line; p. 5-1)

   e. Residual generated from pump and line decontamination (gal) Line 2b x Line 2d __________

   f. Heavy equipment decontamination cost ($) __________(p. 5-2)

   g. Total heavy equipment decontamination time (hrs) __________(p. 5-2)

   h. Residual generation rate for heavy equipment decontamination (gal/hr) __________(100 gal/hr; p. 5-1)

WORKSHEET F-9 (page 2)

i. Residual generated from heavy equipment decontamination (gal) Line 2g x Line 2h ______________

j. Equipment decontamination cost ($) Line 2c + Line 2f ______________

k. Contaminated fluid and/or residues generated (gal) Line 2e + Line 2i ______________

3. Tank Decontamination

a. Number of personnel entering tanks ______________

b. Additional personnel safety equipment unit cost ($/person) ______________($172/person; p. 5-6)

c. Additional personnel safety equipment cost ($) Line 3a x Line 3b ______________

d. Method of tank decontamination ____________________

e. Tank area to be decontaminated (ft^2) ______________

f. Tank decontamination unit cost ($\$/ft^2$) ______________(p. 5-3)

g. Tank decontamination cost ($) Line 3e x Line 3f ______________

h. Tank decontamination subtotal before surcharge ($) Line 3c + Line 3g ______________

i. Surcharge factor (factor ≥ 1) ______________(2.0; p. 5-6)

j. Tank decontamination subtotal ($) Line 3h x (1 + Line 3i) ______________

k. Volume of tank(s) to be filled with sand (gal) ______________

WORKSHEET F-9 (page 3)

l. Sand purchase and placement unit cost ($/gal) ____________ ($0.10/gal; p. 5-7)

m. Tank decontamination and sand filling cost ($)
Line 3j + (Line 3k x Line 3l) ____________

n. Residual generation rate for tank decontamination (gal/ft^2) ____________ (p. 5-3)

o. Contaminated fluid and/or residues generated (gal)
Line 3e x Line 3n ____________

4. Pad or Foundation Decontamination

a. Method of pad decontamination ____________

b. Pad area to be decontaminated (ft^2) ____________

c. Pad decontamination unit cost ($/ft^2) ____________ (p. 5-3)

d. Pad decontamination subtotal ($)
Line 4b x Line 4c ____________

e. Residual generation rate for pad/foundation decontamination (gal/ft^2) ____________ (p. 5-3)

f. Contaminated fluid and/or residues generated (gal)
Line 4b x Line 4e ____________

5. Sump Decontamination

a. Method of sump decontamination ____________

b. Volume to be pumped from sump(s) (gal) ____________

c. Time required for pumping (hrs)
Line 5b ÷ 8000
(round up to nearest integer) ____________

d. Pumping unit cost ($/hr) ____________ ($23/hr; p. 4-11)

WORKSHEET F-9 (page 4)

e. Pump rental cost, optional ($/hr) ____________ ($2.70/hr; p. 4-11)

f. Pumping cost ($) (Line 5c x Line 5d) + Line 5e ____________

g. Sump area to be decontaminated (ft^2) ____________

h. Sump decontamination unit cost ($\$/ft^2$) ____________ (p. 5-3)

i. Sump decontamination cost ($) Line 5g x Line 5h ____________

j. Sump decontamination subtotal ($) Line 5f + Line 5i ____________

k. Residual generation rate for sump decontamination (gal/ft^2) ____________ (p. 5-3)

l. Contaminated fluid and/or residues generated (gal) Line 5b + (Line 5g x Line 5k) ____________

6. Container Rinsing

a. Number of containers ____________

b. Container rinsing time required (hrs) 0.083 x Line 6a ____________

c. Container rinsing unit cost ($/hr) ____________ ($32.75/hr; p. 5-10)

d. Container rinsing subtotal ($) Line 6b x Line 6c ____________

e. Residual generation rate for container rinsing (gal/drum) ____________ (10 gal/drum; p. 5-10)

f. Contaminated fluid/residual generated (gal) Line 6a x Line 6e ____________

7. Other Items Needing Decontamination

a. List items ____

____

WORKSHEET F-9 (page 5)

b. Method of decontamination for other items ______________________

c. Surface area of other items to be decontaminated (ft^2) ______________

d. Decontamination unit cost ($\$/ft^2$) ______________ (p. 5-3)

e. Decontamination of other items subtotal (\$)
Line 7c x Line 7d ______________

f. Residual generation rate for decontamination of other items (gal/ft^2) ______________ (p. 5-3)

g. Contaminated fluid and/or residues generated (gal)
Line 7c x Line 7f ______________

8. On-Site Treatment of Decontamination Residues

a. Quantity of residue to be treated (gal) ______________

b. Chemicals required for treatment (lb/gal residue or gal/gal residue) ______________ (pp. 4-12 - 4-13)

c. Chemicals unit cost (\$/lb or \$/gal) ______________

d. Chemicals cost (\$)
Line 8a x Line 8b x Line 8c ______________

e. Electricity required for treatment (kwh/gal residue) ______________ (pp. 4-12 - 4-13)

f. Electricity unit cost (\$/kwh) ______________ (\$0.05/kwh; p. 4-2)

g. Electricity cost (\$)
Line 8a x Line 8e x Line 8f ______________

h. Water required for treatment (gal/gal residue) ______________ (pp. 4-12 - 4-13)

i. Water unit cost (\$/1000 gal) ______________ (\$1.22/1000 gal; p. 4-2)

j. Water cost (\$)
[(Line 8a x Line 8h) ÷ 1000] x Line 8i ______________

WORKSHEET F-9 (page 6)

k. Fuel required for treatment (MMBtu/gal residue) ____________ (pp. 4-12 - 4-13)

l. Fuel unit cost ($/MMBtu) ____________ (p. 4-2)

m. Fuel cost ($)
Line 8a x Line 8k x Line 8l ____________

n. Labor required for treatment (hrs/gallon residue) ____________ (pp. 4-12 - 4-13)

o. Process operator unit labor cost ($/hr) ____________ ($26.50/hr; p. 9-3)

p. Labor cost ($)
Line 8a x Line 8n x Line 8o ____________

q. On-site treatment cost ($)
Line 8d + Line 8g + Line 8j + Line 8m + Line 8p ____________

r. Residue generated from treatment (gal) ____________

9. Testing for Success of Decontamination

a. Number of Samples ____________

b. Sample collection time required (hrs/sample) ____________

c. Technician unit labor cost ($/hr) ____________ ($20-50/hr; p. 9-3)

d. Sample collection time (hrs)
Line 9a x Line 9b ____________

e. Sampling cost ($)
Line 9c x Line 9d ____________

f. Cost to test each sample ($/sample) ____________ (pp. 5-10 - 5-11)

g. Testing cost ($)
Line 9a x Line 9f ____________

h. Testing for success of decontamination cost ($)
Line 9e + Line 9g ____________

WORKSHEET F-9 (page 7)

10. Treated Residue Discharge to Sewer

    a. Volume of liquid discharged (gal) ______________

    b. Sewer discharge unit cost ($/1000 gal) ______________ ($1.50/1000 gal; p. 4-2)

    c. Sewer discharge cost ($) (Line 10a ÷ 1000) x Line 10b ______________

11. Off-Site Management of Decontamination Fluid/Residues and/or Treatment Residue

    a. Off-site management method ______________________

    b. Quantity to be managed off-site (tons) ______________*

    c. Truck capacity (tons) ______________

    d. Number of loads
       Line 11b ÷ Line 11c
       (round up to nearest integer) ______________

    e. One-way distance (mi/load) ______________

    f. Transportation unit cost ($/mi) ______________ ($4.50/mi; p. 4-15)**

    g. Transportation cost ($)
       Line 11d x Line 11e x Line 11f ______________

    h. Off-site management unit cost ($/ton) ______________ (pp. 4-13 - 4-20)

    i. Off-site management cost ($)
       Line 11b x Line 11h ______________

    j. Contaminated fluid and residue disposal subtotal ($)
       Line 11g + Line 11i ______________

12. On-Site Disposal

    Include volume on one or more worksheets:
      Landfill Inventory - Line 1n, Line 1p
      Incinerator Inventory - Line 1l, Line 1n
      Land Treatment Inventory - Line 1k, Line 1o

---

* Conversion factors are provided in the Volume III appendix.
** Based on a 250-mile one-way distance.

WORKSHEET F-9 (page 8)

13. Facility Decontamination Subtotal ($)
Line 1c + Line 2j + Line 3m + Line 4d +
Line 5j + Line 6d + Line 7e + Line 8q +
Line 9h + Line 10c + Line 11j ☐

WORKSHEET F-10

Removal of Contaminated Soil

1. Protective Clothing

   a. Number of personnel requiring protective clothing for excavation and decontaminating ____________

   b. Protective clothing unit cost ($/person) ____________ ($77/person; p. 6-8)

   c. Protective clothing cost ($) Line 1a x Line 1b ____________

2. Excavation of Contaminated Soil and Earthen Berms

   a. Volume of contaminated soil/berms to be removed (yd^3) ____________

   b. Excavation unit cost, including loading ($/yd^3) ____________ (pp. 6-3 - 6-7)

   c. Mobilization/demobilization cost ($) ____________ (pp. 4-5, 4-7, 4-10, and 6-3)

   d. Contaminated soil/berm removal cost before surcharge ($) (Line 2a x Line 2b) + Line 2c ____________

   e. Surcharge factor ____________ (1.0; pp. 6-8 - 6-9)

   f. Contaminated soil/berm removal subtotal ($) Line 2d x (1 + Line 2e) ____________

3. Equipment Decontamination

   a. Total heavy equipment decontamination time (hrs) ____________ (p. 5-2)

   b. Heavy equipment decontamination cost ($) ____________ (p. 5-2)

   c. Residual generation rate for heavy equipment decontamination (gal/hr) ____________ (100 gal/hr; p. 5-1)

   d. Contaminated fluid and/or residues generated (gal) Line 3a x Line 3c ____________

WORKSHEET F-10 (page 2)

4. On-Site Treatment of Decontamination Residues

   a. Quantity of residue to be treated (gal) ____________

   b. Chemicals required for treatment (lb/gal residue or gal/gal residue) ____________ (pp. 4-12 - 4-13)

   c. Chemicals unit cost ($/lb or $/gal) ____________

   d. Chemicals cost ($) Line 4a x Line 4b x Line 4c ____________

   e. Electricity required for treatment (kwh/gal residue) ____________ (pp. 4-12 - 4-13)

   f. Electricity unit cost ($/kwh) ____________ ($0.05/kwh; p. 4-2)

   g. Electricity cost ($) Line 4a x Line 4e x Line 4f ____________

   h. Water required for treatment (gal/gal residue) ____________ (pp. 4-12 - 4-13)

   i. Water unit cost ($/1000 gal) ____________ ($1.22/1000 gal; p. 4-2)

   j. Water cost ($) [(Line 4a x Line 4h) ÷ 1000] x Line 4i ____________

   k. Fuel required for treatment (MMBtu/gal residue) ____________ (pp. 4-12 - 4-13)

   l. Fuel unit cost ($/MMBtu) ____________ (p. 4-2)

   m. Fuel cost ($) Line 4a x Line 4k x Line 4l ____________

   n. Labor required for treatment (hrs/gallon residue) ____________ (pp. 4-12 - 4-13)

   o. Process operator unit labor cost ($/hr) ____________ ($26.50/hr; p. 9-3)

   p. Labor cost ($) Line 4a x Line 4n x Line 4o ____________

WORKSHEET F-10 (page 3)

q. On-site treatment cost ($)
Line 4d + Line 4g + Line 4j +
Line 4m + Line 4p ________

r. Residue generated from treatment
(gal) ________

5. Treated Residue Discharge to Sewer

a. Volume of liquid discharged (gal) ________

b. Sewer discharge unit cost
($/1000 gal) ________ ($1.50/1000 gal, p. 4-2)

c. Sewer discharge cost ($)
(Line 5a ÷ 1000) x Line 5b ________

6. Off-Site Management of Contaminated Soil, Decontamination Residue, and/or Treatment Residue

a. Quantity to be managed off-site
(tons) ________*

b. Truck capacity (tons) ________

c. Number of loads
Line 6a ÷ Line 6b
(round up to nearest integer) ________

d. One-way distance (mi/load) ________

e. Transportation unit cost ($/mi) ________($4.50/mi; p. 4-15)**

f. Transportation cost ($)
Line 6c x Line 6d x Line 6e ________

g. Off-site management unit
cost ($/ton) ________(pp. 4-13 - 4-20)

h. Off-site management cost ($)
Line 6a x Line 6g ________

i. Off-site management subtotal ($)
Line 6f + Line 6h ________

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* Conversion factors are provided in the Volume III appendix.
** Based on a 250-mile one-way distance.

WORKSHEET F-10 (page 4)

7. On-Site Disposal

Include volume on one or more worksheets:
- Landfill Inventory - Line 1n, Line 1o, Line 1p
- Incinerator Inventory - Line 1l, Line 1n, Line 1o
- Land Treatment Inventory - Line 1k, Line 1l, Line 1o

8. Contaminated Soil Removal Subtotal ($)
Line 1c + Line 2f + Line 3b + Line 4q +
Line 5c + Line 6i

WORKSHEET F-11

Certification of Partial Closures (if Applicable)

1. Independent Registered Professional Engineer

   a. Initial review of closure plan (hrs) ______________ (4 hrs; p. 8-4)

   b. Total number of inspections for all partial closures ______________

   c. Inspection time required (hrs/inspection) ______________ (p. 8-3)

   d. Inspection time required (hrs)
   Line 1b x Line 1c ______________

   e. Prepare final documentation (hrs) ______________ (4 hrs; p. 8-4)

   f. Total professional engineer time required (hrs)
   Line 1a + Line 1d + Line 1e ______________

   g. Professional engineer unit labor cost ($/hr) ______________ ($45.50/hr; p. 8-3)

   h. Professional engineer cost ($)
   Line 1f x Line 1g ______________

2. Independent Qualified Soil Scientist (Optional)

   a. Initial review of closure plan (hrs) ______________ (4 hrs; p. 8-4)

   b. Total number of inspections for all partial closures ______________

   c. Inspection time required (hrs/inspection) ______________ (p. 8-3)

   d. Inspection time required (hrs)
   Line 2b x Line 2c ______________

   e. Prepare final documentation (hrs) ______________ (4 hrs; p. 8-4)

WORKSHEET F-11 (page 2)

f. Total soil scientist time required (hrs) Line 2a + Line 2d + Line 2e ______

g. Soil scientist unit labor cost ($/hr) ______ ($45.50/hr; p. 8-3)

h. Soil scientist cost ($) Line 2f x Line 2g ______

3. Clerical*

a. Number of weeks for all partial closures ______

b. Clerical time required (hrs/wk) ______ (2 hrs/wk; p. 8-3)

c. Clerical unit labor cost ($/hr) ______ ($18/hr; p. 8-3)

d. Clerical cost ($) Line 3a x Line 3b x Line 3c ______

4. Certification of Partial Closures Subtotal ($) Line 1h + Line 2h + Line 3d ☐

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* Clerical time should be included only if the Professional Engineer or Soil Scientist is operating independently in a single-person business.

WORKSHEET F-12

Survey Plat - Partial Closures

1. Surveying of Waste Management Area Boundaries
    - a. Number of separate partial closures ________
    - b. Land surveying team time required (hrs/partial closure) ________
    - c. Land surveying team unit labor cost ($/hr) ________ ($75/hr; p. 9-3)
    - d. Land surveying cost ($) Line 1a x Line 1b x Line 1c ________
2. Fence Posts to Mark Boundaries
    - a. Number of fence posts for all partial closures ________
    - b. Fence post unit cost ($/post) ________ ($29/post; p. 3-7)
    - c. Fence post cost ($) Line 2a x Line 2b ________
3. Plat Submittal
    - a. Attorney time required (hrs/partial closure) ________
    - b. Attorney unit labor cost ($/hr) ________ ($100/hr; p. 9-3)
    - c. Attorney cost ($) Line 1a x Line 3a x Line 3b ________
    - d. Clerical time required (hrs/partial closure) ________
    - e. Clerical unit labor cost ($/hr) ________ ($18/hr; p. 9-3)
    - f. Clerical cost ($) Line 1a x Line 3d x Line 3e ________
    - g. Plat submittal cost ($) Line 3c + Line 3f ________
4. Notice to Local Land Authority Subtotal ($) Line 1d + Line 2c + Line 3g ☐

WORKSHEET F-13

Certification of Final Closure

1. Independent Registered Professional Engineer
   - a. Initial review of closure plan (hrs) ______________ (8 hrs; p. 8-4)
   - b. Inspection frequency (inspections/wk) ______________ (p. 8-3)
   - c. Inspection time required (hrs/inspection) ______________ (p. 8-3)
   - d. Number of weeks for closure (wks) ______________
   - e. Inspection time required (hrs) Line 1b x Line 1c x Line 1d ______________
   - f. Prepare final documentation (hrs) ______________ (4 hrs; p. 8-4)
   - g. Total professional engineer time required (hrs) Line 1a + Line 1e + Line 1f ______________
   - h. Professional engineer unit labor cost ($/hr) ______________ ($45.50/hr; p. 8-3)
   - i. Professional engineer cost ($) Line 1g x Line 1h ______________

2. Independent Qualified Soil Scientist (Optional)
   - a. Initial review of closure plan (hrs) ______________ (8 hrs; p. 8-4)
   - b. Inspection frequency (inspections/wk) ______________ (p. 8-3)
   - c. Inspection time required (hrs/inspection) ______________ (p. 8-3)

WORKSHEET F-13 (page 2)

d. Inspection time required (hrs)
Line 1d x Line 2b x Line 2c ______________

e. Prepare final documentation (hrs) ______________(4 hrs; p. 8-4)

f. Total soil scientist time required (hrs)
Line 2a + Line 2d + Line 2e ______________

g. Soil scientist unit labor cost ($/hr) ______________($45.50/hr; p. 8-3)

h. Soil scientist cost ($)
Line 2f x Line 2g ______________

3. Clerical*

a. Clerical time required (hrs/wk) ______________(2 hrs/wk; p. 8-3)

b. Clerical unit labor cost ($/hr) ______________($18/hr; p. 8-3)

c. Clerical cost ($)
Line 1d x Line 3a x Line 3b ______________

4. Certification of Closure Subtotal ($)
Line 1i + Line 2h + Line 3c ☐

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* Clerical time should be included only if the Professional Engineer or Soil Scientist is operating independently in a single-person business.

WORKSHEET F-14

Survey Plat - Final Closure

1. Surveying of Waste Management Area Boundaries
   - a. Land surveying team time required (hrs) ____________
   - b. Land surveying team unit labor cost ($/hr) ____________ ($75/hr; p. 9-3)
   - c. Land surveying cost ($) Line 1a x Line 1b ____________

2. Fence Posts to Mark Boundaries
   - a. Number of fence posts ____________
   - b. Fence post unit cost ($/post) ____________ ($29/post; p. 3-7)
   - c. Fence post cost ($) Line 2a x Line 2b ____________

3. Plat Submittal
   - a. Attorney time required (hrs) ____________
   - b. Attorney unit labor cost ($/hr) ____________ ($100/hr; p. 9-3)
   - c. Attorney cost ($) Line 3a x Line 3b ____________
   - d. Clerical time required (hrs) ____________
   - e. Clerical unit labor cost ($/hr) ____________ ($18/hr; p. 9-3)
   - f. Clerical cost ($) Line 3d x Line 3e ____________
   - g. Plat submittal cost ($) Line 3c + Line 3f ____________

4. Notice to Local Land Authority Subtotal ($) Line 1c + Line 2c + Line 3g ☐

CHAPTER 5

LANDFILL

This chapter contains the worksheets for estimating Part 264 or Part 265 closure costs for landfills. These worksheets apply to all landfills. If there is no gas monitoring system, the user does not need to complete Worksheet G-3. Worksheet G-8 will not be applicable if there is no contaminated soil at the facility. The landfill worksheets address the following items:

- Inventory Management
    1. Inventory quantity (maximum)
    2. Solidification
    3. Dewatering
    4. On-site treatment of liquid waste inventory
    5. Treated waste discharge to sewer
    6. Containerization of bulk waste
    7. On-site landfilling
    8. On-site disposal
    9. Container loading
    10. Off-site management of inventory and/or treatment residue

- Leachate and/or Run-Off Management
    1. Leachate and/or run-off collection
    2. On-site treatment of leachate/run-off
    3. Treated leachate/run-off discharge to sewer
    4. Off-site management of leachate/run-off and/or treatment residue
    5. Solidification prior to on-site landfill disposal
    6. On-site disposal
    7. Leachate collection system maintenance
    8. Leak detection system maintenance

- Gas Monitoring

    1. Monitoring
    2. Administrative (reporting)
    3. Maintenance of gas collection system

- Groundwater Monitoring - Part 264 Only

    1. Detection monitoring - background/upgradient wells
    2. Detection monitoring - compliance point/downgradient wells
    3. Compliance monitoring - background/upgradient wells
    4. Compliance monitoring - for selected hazardous constituents at compliance point/downgradient wells
    5. Compliance monitoring - for Appendix VIII constituents at compliance point/downgradient wells
    6. Administrative (reporting)
    7. Monitoring well maintenance and replacement

- Groundwater Monitoring - Part 265 Only

    1. Groundwater quality analysis
    2. Groundwater contamination analysis
    3. Administrative (reporting)
    4. Monitoring well maintenance and replacement

- Inspection and Repairs

    1. Inspection
    2. Fence installation or repair
    3. Other security equipment repair

- Testing for Soil Contamination

  1. Background samples and samples with potential contamination
  2. Preparation of isogram plan

- Decontamination

  1. Protective clothing and safety equipment for facility personnel
  2. Equipment decontamination
  3. Tank decontamination
  4. Pad or foundation decontamination
  5. Sump decontamination
  6. Container rinsing
  7. Other items needing decontamination
  8. On-site treatment of decontamination residues
  9. Testing for success of decontamination
  10. Treated residue discharge to sewer
  11. Off-site management of decontamination fluid/residue and/or treatment residue
  12. On-site disposal

- Removal of Contaminated Soil

  1. Protective clothing
  2. Excavation of contaminated soil and earthen berms
  3. Equipment decontamination
  4. On-site treatment of decontamination residues
  5. Treated residue discharge to sewer
  6. Off-site management of contaminated soil, decontamination residue, and/or treatment residue
  7. On-site disposal

- Final Cover

  1. Native soil for slope and fill
  2. On-site clay

3. Off-site clay
4. Synthetic membrane
5. Sand
6. Gravel
7. Drainage tile
8. Geotextile filter fabric
9. Topsoil
10. Crushed stone
11. Mobilization/demobilization

- Revegetation

  1. Soil preparation and grading
  2. Seeding
  3. Fertilizing
  4. Mulching
  5. Mobilization/demobilization

- Certification of Partial Closures

  1. Independent registered professional engineer
  2. Clerical

- Survey Plat - Partial Closures

  1. Surveying of waste management area boundaries
  2. Fence posts to mark boundaries
  3. Plat submittal

- Certification of Final Closure

  1. Independent registered professional engineer
  2. Clerical

- Survey Plat - Final Closure

  1. Surveying of waste management area boundaries
  2. Fence posts to mark boundaries
  3. Plat submittal

WORKSHEET G-1

Inventory Management

1. Inventory Quantity (Maximum)*

   a. Landfill inventory (tons) ____________

   b. Treated leachate and/or run-off from landfill (tons) ____________

   c. Treated liquid from surface impoundment(s) (tons) ____________

   d. Sludge/residue from surface impoundment(s) (tons) ____________

   e. Inventory from waste piles (tons) ____________

   f. Treated leachate and run-off from surface impoundment(s) (tons) ____________

   g. Treated leachate and/or run-off from waste pile(s) (tons) ____________

   h. Treated container and drum waste (tons) ____________

   i. Treated tank waste (tons) ____________

   j. Inventory from incineration (tons) ____________

   k. Incinerator ash (tons) ____________

   l. Inventory from land treatment (tons) ____________

   m. Rubble from demolition/excavation of foundations, containment, etc. (tons) ____________

   n. Decontamination fluid/residue (tons) ____________

   o. Contaminated soil (tons) ____________

   p. Residues from treatment of waste inventory, decontamination fluid, and/or leachate (tons) ____________

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* Conversion factors are provided in the Volume III appendix.

WORKSHEET G-1 (page 2)

q. Incinerator refractory (tons) ________________

r. Run-on/run-off from land treatment (tons) ________________

s. Other (tons) ________________

t. Total inventory (tons)
Line 1a + Line 1b + Line 1c +
Line 1d + Line 1e + Line 1f +
Line 1g + Line 1h + Line 1i +
Line 1j + Line 1k + Line 1l +
Line 1m + Line 1n + Line 1o +
Line 1p + Line 1q + Line 1r +
Line 1s ________________

2. Solidification

a. Waste quantity to be solidified (tons) ________________

b. Type of solidification material ________________

c. Solidification unit cost ($/ton) ________________ (p. 4-11)

d. Solidification cost ($)
Line 2a x Line 2c ________________

e. Change in waste quantity (factor $\geq$ 1) ________________ (1.0; p. 4-11)

f. Final solidified waste quantity (tons)
Line 2a x (1 + Line 2e) ________________

3. Dewatering

a. Waste quantity to be dewatered (tons) ________________

b. Dewatering unit cost ($/wet ton) ________________ ($5.50/wet ton; p. 4-9)

c. Dewatering cost ($)
Line 3a x Line 3b ________________

d. Change in waste quantity (decimal $<$ 1) ________________ (0.17; p. 4-9)

e. Final dewatered waste quantity (tons)
Line 3a x Line 3d ________________

WORKSHEET G-1 (page 3)

4. On-Site Treatment of Liquid Waste Inventory

   a. Quantity of waste to be treated (gal) ______________

   b. Chemicals required for treatment (lb/gal waste or gal/gal waste) ______________ (pp. 4-12 - 4-13)

   c. Chemicals unit cost ($/lb or $/gal) ______________

   d. Chemicals cost ($) Line 4a x Line 4b x Line 4c ______________

   e. Electricity required for treatment (kwh/gal waste) ______________ (pp. 4-12 - 4-13)

   f. Electricity unit cost ($/kwh) ______________ ($0.05/kwh; p. 4-2)

   g. Electricity cost ($) Line 4a x Line 4e x Line 4f ______________

   h. Water required for treatment (gal/gal waste) ______________ (pp. 4-12 - 4-13)

   i. Water unit cost ($/1000/gal) ______________ ($1.22/1000 gal; p. 4-2)

   j. Water cost ($) [(Line 4a x Line 4h) ÷ 1000] x Line 4i ______________

   k. Fuel required for treatment (MMBtu/gal waste) ______________ (pp. 4-12 - 4-13)

   l. Fuel unit cost ($/MMBtu) ______________ (p. 4-2)

   m. Fuel cost ($) Line 4a x Line 4k x Line 4l ______________

   n. Labor required for treatment (hrs/gallon waste) ______________ (pp. 4-12 - 4-13)

   o. Process operator unit labor cost ($/hr) ______________ ($26.50/hr; p. 9-3)

   p. Labor cost ($) Line 4a x Line 4n x Line 4o ______________

   q. On-site treatement cost ($) Line 4d + Line 4g + Line 4j + Line 4m + Line 4p ______________

   r. Residue generated from treatment (gal) ______________

WORKSHEET G-1 (page 4)

5. Treated Waste Discharge to Sewer

    a. Volume of liquid discharged (gal) ____________

    b. Sewer discharge unit cost ($/1000 gal) ____________ ($1.50/1000 gal; p. 4-2)

    c. Sewer discharge cost ($) (Line 5a ÷ 1000) x Line 5b ____________

6. Containerization of Bulk Waste

    a. Quantity of waste to be containerized (gal) ____________

    b. Container capacity (gal/container) ____________ (55 gal/container; p.4-6)

    c. Number of containers needed Line 6a ÷ Line 6b ____________

    d. Containerization unit cost ($/container) ____________ (pp. 4-6 and 4-8)

    e. Containerization cost ($) Line 6c x Line 6d ____________

7. On-Site Landfilling

    a. Quantity of bulk solid waste to be landfilled on-site (yd^3) ____________*

    b. Bulk solid waste placement unit cost, including daily cover ($\$/yd^3$) ____________ ($\$3.98/yd^3$; p. 4-10)

    c. Bulk solid waste placement cost ($) Line 7a x Line 7b ____________

    d. Quantity of containerized liquid waste to be landfilled (tons) ____________*

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* Conversion factors are provided in the Volume III appendix.

WORKSHEET G-1 (page 5)

e. Containerized liquid waste placement unit cost, including daily cover ($/ton) ______________ ($2.10/ton; p. 4-10)

f. Containerized liquid waste placement cost ($)
Line 7d x Line 7e ______________

g. Mobilization/demobilization cost ($) ______________

h. Total on-site landfilling cost ($)
Line 7c + Line 7f + Line 7g ______________

8. On-Site Disposal

Include volume on one or more worksheets:
Incinerator Inventory - Line 1h, Line 1n
Land Treatment Inventory - Line 1f, Line 1o

9. Container Loading

a. Number of containers ______________

b. Number of pallets
Line 9a ÷ 4
(round up to nearest integer) ______________

c. Loading unit cost ($/pallet) ______________ ($4.66/pallet; p. 4-8)

d. Container loading cost ($)
Line 9b x Line 9c ______________

10. Off-Site Management of Inventory and/or Treatment Residue

a. Quantity to be managed off-site (tons) ______________*

b. Truck capacity (tons) ______________

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* Conversion factors are provided in Volume III appendix.

WORKSHEET G-1 (page 6)

c. Number of loads
Line 10a ÷ Line 10b
(round up to nearest integer) ______________

d. One-way distance (mi/load) ______________

e. Transportation unit cost ($/mi) ______________ ($4.50/mi; p. 4-15)**

f. Transportation cost ($)
Line 10c x Line 10d x Line 10e ______________

g. Off-site management unit cost
($/ton) ______________ (pp. 4-13 - 4-20)

h. Off-site management cost ($)
Line 10a x Line 10g ______________

i. Off-site management subtotal ($)
Line 10f + Line 10h ______________

6. Landfill Inventory Management Subtotal ($)
Line 2d + Line 3c + Line 4q + Line 5c +
Line 6e + Line 7h + Line 9d + Line 10i ☐

** Based on a 250-mile one-way distance.

WORKSHEET G-2

Leachate and/or Run-Off Management

1. Leachate and/or Run-Off Collection

   a. Leachate and/or run-off volume collected during closure (gal) ______________

   b. Time required for pumping (hrs) Line 1a ÷ 8000 (round up to nearest integer) ______________

   c. Pumping unit cost ($/hr) ______________ ($23/hr; p. 4-11)

   d. Pump rental cost, optional ($/hr) ______________ ($2.70/hr; p. 4-11)

   e. Pumping cost ($) Line 1b x (Line 1c + Line 1d) ______________

2. On-Site Treatment of Leachate/Run-Off

   a. Quantity of leachate/run-off to be treated (gal) ______________

   b. Chemicals required for treatment (lb/gal leachate/run-off or gal/gal leachate/run-off) ______________ (pp. 4-12 - 4-13)

   c. Chemicals unit cost ($/lb or $/gal) ______________

   d. Chemicals cost ($) Line 2a x Line 2b x Line 2c ______________

   e. Electricity required for treatment (kwh/gal leachate/run-off) ______________ (pp. 4-12 - 4-13)

   f. Electricity unit cost ($/kwh) ______________ ($0.05/kwh; p. 4-2)

   g. Electricity cost ($) Line 2a x Line 2e x Line 2f ______________

   h. Water required for treatment (gal/gal leachate/run-off) ______________ (pp. 4-12 - 4-13)

   i. Water unit cost ($/1000 gal) ______________ ($1.22/1000 gal; p. 4-2)

   j. Water cost ($) [(Line 2a x Line 2h) ÷ 1000] x Line 2i ______________

   k. Fuel required for treatment (MMBtu/gal leachate/run-off) ______________ (pp. 4-12 - 4-13)

WORKSHEET G-2 (page 2)

l. Fuel unit cost ($MMBtu) ____________ (p. 4-2)

m. Fuel cost ($)
Line 2a x Line 2k x Line 2l ____________

n. Labor required for treatment
(hrs/gallon leachate/run-off) ____________ (pp. 4-12 - 4-13)

o. Process operator unit labor
cost ($/hr) ____________ ($26.50/hr; p. 9-3)

p. Labor cost ($)
Line 2a x Line 2n x Line 2o ____________

q. On-site treatment cost ($)
Line 2d + Line 2g + Line 2j +
Line 2m + Line 2p ____________

r. Residue generated from treatment
(gal) ____________

3. Treated Leachate/Run-Off Discharge to Sewer

a. Quantity discharged (gal) ____________

b. Sewer discharge unit cost
($/1000 gal) ____________ ($1.50/1000 gal;
p. 4-2)

c. Sewer discharge cost ($)
(Line 3a ÷ 1000) x Line 3b ____________

4. Off-Site Management of Leachate/Run-Off
and/or Treatment Residue

a. Amount to be managed off-site (tons) ____________*

b. Truck capacity (tons) ____________

c. Number of loads
Line 4a ÷ Line 4b
(round up to nearest integer) ____________

d. One-way distance (mi/load) ____________

e. Transportation unit cost ($/mi) ____________ ($4.50/mi; p. 4-15)**

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* Conversion factors are provided in the Volume III appendix.

** Based on a 250-mile one-way distance.

WORKSHEET G-2 (page 3)

f. Transportation cost ($)
Line 4c x Line 4d x Line 4e ______________

g. Off-site management unit cost
($/ton) ______________(pp. 4-13 - 4-20)

h. Off-site management cost ($)
Line 4a x Line 4g ______________

i. Off-site management subtotal ($)
Line 4f + Line 4h ______________

5. Solidification Prior to On-Site Landfill Disposal

a. Quantity to be solidified (tons) ______________*

b. Type of solidification material__________________

c. Solidification unit cost ($/ton) ______________(p. 4-11)

d. Solidification cost ($)
Line 5a x Line 5c ______________

e. Change in waste quantity
(factor ≥ 1) ______________(1.0; p. 4-11)

f. Final solidified wate
quantity (tons)
Line 5a x (1 + Line 5e) ______________

6. On-Site Disposal

Include volume on one or more worksheets:
Landfill Inventory - Line 1b, Line 1f, Line 1g, Line 1p
Incinerator Inventory - Line 1j, Line 1k, Line 1m, Line 1n
Land Treatment Inventory - Line 1h, Line 1m, Line 1n, Line 1o

7. Leachate Collection System Maintenance (if applicable)

a. Maintenance time required (hrs) ______________

b. Unit labor cost ($/hr) ______________($23/hr; p. 9-3)

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* Conversion factors are provided in the Volume III appendix.

WORKSHEET G-2 (page 4)

c. Maintenance labor cost ($)
Line 7a x Line 7b ______________

d. Number of pumps needing
replacement ______________

e. Pump unit cost ($/pump) ______________(p. 3-4)

f. Pump cost ($)
Line 7d x Line 7e ______________

g. Total maintenance cost ($)
Line 7c + Line 7f ______________

8. Leak Detection System Maintenance (if applicable)

a. Maintenance time required (hrs) ______________

b. Unit labor cost ($/hr) ______________($23/hr; p. 9-3)

c. Maintenance labor cost ($)
Line 8a x Line 8b ______________

d. Number of pumps needing
replacement ______________

e. Pump unit cost ($/pump) ______________(p. 3-4)

f. Pump cost ($)
Line 8d x Line 8e ______________

g. Total maintenance cost ($)
Line 8c + Line 8f ______________

9. Leachate and/or Run-Off Management
Subtotal ($)
Line 1e + Line 2g + Line 3c +
Line 4i + Line 5d + Line 7g +
Line 8g ☐

WORKSHEET G-3

Gas Monitoring (if Applicable)

1. Monitoring

   a. Number of gas monitoring wells ____________

   b. Time required to monitor well (hrs/well) ____________ (0.25 hrs/well; p. 2-17)

   c. Contract lab technician unit labor cost ($/hr) ____________ ($20.50/hr; p. 9-3)

   d. Number of times gas monitoring is done during closure ____________

   e. Gas monitoring cost ($)
   Line 1a x Line 1b x Line 1c x Line 1d ____________

2. Administrative (Reporting)

   a. Contract lab technician time required (hrs/well) ____________

   b. Technician unit labor cost ($/hr) ____________ ($20.50/hr; p. 9-3)

   c. Technician cost ($)
   Line 1a x Line 1d x Line 2a x Line 2b ____________

   d. Clerical time required (hrs/well) ____________

   e. Clerical unit labor cost ($/hr) ____________ ($18/hr; p. 9-3)

   f. Clerical cost ($)
   Line 1a x Line 1d x Line 2d x Line 2e ____________

   g. Administrative subtotal ($)
   Line 2c + Line 2f ____________

3. Maintenance of Gas Collection System

   a. Maintenance time required (hrs) ____________

   b. Unit labor cost ($/hr) ____________ ($23/hr; p. 9-3)

   c. Maintenance cost ($)
   Line 3a x Line 3b

4. Gas Monitoring Subtotal ($)
Line 1e + Line 2g + Line 3c ☐

WORKSHEET G-4, PART 264 ONLY

Groundwater Monitoring

1. Detection Monitoring - Background/Upgradient Wells (continuation of monitoring program from operating period)

   a. Number of wells ________

   b. Number of samples collected per well (samples/well) ________

   c. Number of replicate analyses per sample (replicates/sample) ________

   d. Number of analyses Line 1a x Line 1b x Line 1c ________ (minimum of 4)

   e. Sample collection and preparation time required (hrs/well) ________ (4 hrs/well; p. 2-9)

   f. Transportation time to and from site (hrs) ________

   g. Contract lab technician unit labor cost ($/hr) ________ ($20.50/hr; p. 9-3)

   h. Sample collection time (hrs) (Line 1a x Line 1e) + Line 1f ________

   i. Sampling cost ($) Line 1g x Line 1h ________

   j. Contract lab fee ($/analysis) ________ (p. 2-10)

   k. Contract lab cost ($) Line 1d x Line 1j ________

   l. Number of times upgradient detection monitoring samples are collected during closure ________ (quarterly for one year; p. 2-3)

   m. Upgradient/background detection monitoring cost ($) (Line 1i + Line 1k) x Line 1l ________

WORKSHEET G-4, PART 264 ONLY (page 2)

2. Detection Monitoring - Compliance Point/Downgradient Wells (continuation of monitoring program from operating period)

    a. Number of wells ______________

    b. Number of samples collected per well (samples/well) ______________

    c. Number of replicate analyses per sample (replicates/sample) ______________

    d. Number of analyses Line 2a x Line 2b x Line 2c ______________

    e. Sample collection and preparation time required (hrs/well) ______________(4 hrs/well; p. 2-9)

    f. Transportation time to and from site (hrs) ______________

    g. Contract lab technician unit labor cost ($/hr) ______________($20.50/hr; p. 9-3)

    h. Sample collection time (hrs) (Line 2a x Line 2e) + Line 2f ______________

    i. Sampling cost ($) Line 2g x Line 2h ______________

    j. Contract lab fee ($/analysis) ______________(p. 2-10)

    k. Contract lab cost ($) Line 2d x Line 2j ______________

    l. Number of times downgradient detection monitoring samples are collected during closure ______________(twice/year; p. 2-3)

    m. Downgradient/compliance point detection monitoring cost ($) (Line 2i + Line 2k) x Line 2l ______________

3. Compliance Monitoring - Background/Upgradient Wells (continuation of monitoring program from operating period)

    a. Number of wells ______________

WORKSHEET G-4, PART 264 ONLY (page 3)

b. Number of samples collected per well (samples/well) ____________

c. Number of replicate analyses per sample (replicates/sample) ____________

d. Number of analyses Line 3a x Line 3b x Line 3c ____________(minimum of 4)

e. Sample collection and preparation time required (hrs/well) ____________(4 hrs/well; p. 2-9)

f. Transportation time to and from site (hrs) ____________

g. Contract lab technician unit labor cost ($/hr) ____________($20.50/hr; p. 9-3)

h. Sample collection time (hrs) (Line 3a x Line 3e) + Line 3f ____________

i. Sampling cost ($) Line 3g x Line 3h ____________

j. Contract lab fee ($/analysis) ____________(p. 2-10)

k. Contract lab cost ($) Line 3d x Line 3j ____________

l. Number of times upgradient compliance monitoring samples are collected during closure ____________(quarterly for one year; p. 2-4)

m. Upgradient/background compliance monitoring cost ($) (Line 3i + Line 3k) x Line 3l ____________

4. Compliance Monitoring - for Selected Hazardous Constituents at Compliance Point/Downgradient Wells (continuation of monitoring program from operating period)

a. Number of wells ____________

b. Number of samples collected per well (samples/well) ____________

c. Number of replicate analyses per sample (replicates/sample) ____________

WORKSHEET G-4, PART 264 ONLY (page 4)

d. Number of analyses Line 4a x Line 4b x Line 4c ____________

e. Sample collection and preparation time required (hrs/well) ____________(4 hrs/well; p. 2-9)

f. Transportation time to and from site (hrs) ____________

g. Contract lab technician unit labor cost ($/hr) ____________($20.50/hr; p. 9-3)

h. Sample collection time (hrs) (Line 4a x Line 4e) + Line 4f ____________

i. Sampling cost ($) Line 4g x Line 4h ____________

j. Contract lab fee ($/analysis) ____________(p. 2-10)

k. Contract lab cost ($) Line 4d x Line 4j ____________

l. Number of times downgradient hazardous constituent compliance monitoring samples are collected during closure ____________(quarterly; p. 2-4)

m. Downgradient hazardous constituent compliance monitoring cost ($) (Line 4i + Line 4k) x Line 4l ____________

5. Compliance Monitoring - for Appendix VIII Constituents at Compliance Point/Downgradient Wells (continuation of monitoring program from operating period)

a. Number of wells ____________

b. Number of samples collected per well (samples/well) ____________

c. Number of replicate analyses per sample (replicates/sample) ____________

d. Number of analyses Line 5a x Line 5b x Line 5c ____________

e. Sample collection and preparation time required (hrs/well) ____________(4 hrs/well; p. 2-9)

WORKSHEET G-4, PART 264 ONLY (page 5)

f. Transportation time to and from site (hrs) __________

g. Contract lab technician unit labor costs ($/hr) __________ ($20.50/hr; p. 9-3)

h. Sample collection time (hrs) (Line 5a x Line 5e) + Line 5f __________

i. Sampling cost ($) Line 5g x Line 5h __________

j. Contract lab fee ($/analysis) __________ (p. 2-10)

k. Contract lab cost ($) Line 5d x Line 5j __________

l. Number of times downgradient Appendix VIII compliance monitoring samples are collected during closure __________ (annually; p. 2-4)

m. Downgradient Appendix VIII constituents compliance monitoring cost ($) (Line 5i + Line 5k) x Line 4l __________

6. Administrative (Reporting)

a. Number of analyses
(Line 1d x Line 1l) +
(Line 2d x Line 2l) +
(Line 3d x Line 3l) +
(Line 4d x Line 4l) +
(Line 5d x Line 5l) __________

b. Contract lab technician time required (hrs/analysis) __________

c. Contract lab technician unit labor cost ($/hr) __________ ($20.50/hr; p. 9-3)

d. Technician cost ($) Line 6a x Line 6b x Line 6c __________

e. Clerical time required (hrs/analysis) __________

f. Clerical unit labor cost ($/hr) __________ ($18/hr; p. 9-3)

g. Clerical cost ($) Line 6a x Line 6e x Line 6f __________

h. Administration subtotal ($) Line 6d + Line 6g __________

WORKSHEET G-4, PART 264 ONLY (page 6)

7. Monitoring Well Maintenance and Replacement

    a. Total number of wells ______________

    b. Maintenance time required (hrs/well) ______________

    c. Unit labor cost ($/hr) ______________ ($23/hr; p. 9-3)

    d. Monitoring well maintenance cost ($) Line 7a x Line 7b x Line 7c ______________

    e. Number of wells needing replacement ______________

    f. Existing monitoring well sealing unit cost ($/well) ______________ ($300/well; p. 3-5)*

    g. New monitoring well construction unit cost ($/well) ______________ ($4125/well; p. 3-5)*

    h. Mobilization/demobilization ($) ______________ ($150; p. 3-5)

    i. Monitoring well replacement cost ($) [Line 7e x (Line 7f + Line 7g)] + Line 7h ______________

    j. Number of pumps needing replacement ______________ (p. 3-5)

    k. Pump unit cost ($/pump) ______________

    l. Pump cost ($) Line 7j x Line 7k ______________

    m. Number of wells needing tubing replacement ______________

    n. Length of tubing (ft/well) ______________

    o. Tubing unit cost ($/ft) ______________ (p. 3-5)

    p. Tubing replacement cost ($) Line 7m x Line 7n x Line 7o ______________

    q. Number of wells needing cap replacement ______________

    r. Well cap unit cost ($/cap) ______________

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* Based on a depth of 100 vertical lineal feet.

WORKSHEET G-4, PART 264 ONLY (page 7)

s. Well cap replacement cost ($)
Line 7q x Line 7r ____________

t. Monitoring well maintenance and replacement cost ($)
Line 7d + Line 7h + Line 7i +
Line 7l + Line 7p + Line 7s ____________

8. Groundwater Monitoring Subtotal ($)
Line 1m + Line 2m + Line 3m +
Line 4m + Line 5m + Line 6h + Line 7t ☐

WORKSHEET G-4, PART 265 ONLY

Groundwater Monitoring

1. Groundwater Quality Analysis

   a. Number of wells ______________ (minimum of 4; p. 2-1)

   b. Number of samples collected per well (samples/well) ______________

   c. Number of replicate analyses per sample (replicates/sample) ______________

   d. Number of analyses Line 1a x Line 1b x Line 1c ______________

   e. Sample collection and preparation time required (hrs/well) ______________ (4 hrs/well; p. 2-4)

   f. Transportation time to and from site (hrs) ______________

   g. Contract lab technician unit labor cost ($/hr) ______________ ($20.50/hr; p. 9-3)

   h. Sample collection time (hrs) (Line 1a x Line 1e) + Line 1f ______________

   i. Sampling cost ($) Line 1g x Line 1h ______________

   j. Contract lab fee ($/analysis) ______________ ($85/analysis; p. 2-5)

   k. Contract lab cost ($) Line 1d x Line 1j ______________

   l. Number of times groundwater quality samples are collected during closure ______________

   m. Groundwater quality sampling cost ($) (Line 1i + Line 1k) x Line 1l ______________

2. Groundwater Contamination Analysis

   a. Number of wells ______________ (minimum of 4; p. 2-1)

   b. Number of samples collected per well (samples/well) ______________

WORKSHEET G-4, PART 265 ONLY (page 2)

c. Number of replicate analyses per sample (replicates/sample) ____________ (4 replicates/sample; p. 2-2)

d. Number of analyses Line 2a x Line 2b x Line 2c ____________

e. Sample collection and preparation time required (hrs/well) ____________ (4 hrs/well; p. 2-6)

f. Transportation time to and from site (hrs) ____________

g. Contract lab technician unit labor cost ($/hr) ____________ ($20.50/hr; p. 9-3)

h. Sample collection time (hrs) (Line 2a x Line 2e) + Line 2f ____________

i. Sampling cost ($) Line 2g x Line 2h ____________

j. Contract lab fee ($/analysis) ____________ [illegible]20/analysis; [illegible] 2-7)

k. Contract lab cost ($) Line 2d x Line 2j ____________

l. Number of times groundwater contamination samples are collected during closure ____________

m. Groundwater contamination sampling cost ($) (Line 2i + Line 2k) x Line 2l ____________

3. Administrative (Reporting)

a. Total number of analyses (Line 1d x Line 1l) + (Line 2d x Line 2l) ____________

b. Contract lab technician time required (hrs/analysis) ____________

c. Technician unit labor cost ($/hr) ____________ ($20.50/hr; p. 9-3)

d. Technician cost ($) Line 3a x Line 3b x Line 3c ____________

e. Clerical time required (hrs/set of analysis) ____________

WORKSHEET G-4, PART 265 ONLY (page 3)

f. Clerical unit labor cost ($/hr) ____________($18/hr; p. 9-3)

g. Clerical cost ($)
Line 3a x Line 3e x Line 3f ____________

h. Administration subtotal ($)
Line 3d + Line 3g ____________

4. Monitoring Well Maintenance and Replacement

a. Total number of wells ____________

b. Maintenance time required
(hrs/well) ____________

c. Unit labor cost ($/hr) ____________($23/hr; p. 9-3)

d. Monitoring well maintenance cost ($)
Line 4a x Line 4b x Line 4c ____________

e. Number of wells needing replacement ____________

f. Existing monitoring well sealing
unit cost ($/well) ____________($300/well; p. 3-5)*

g. New monitoring well construction
unit cost ($/well) ____________($4125/well; p. 3-5)*

h. Mobilization/demobilization ($) ____________($150; p. 3-5)

i. Monitoring well replacement cost ($)
[Line 4e x (Line 4f + Line 4g)] +
Line 4h ____________

j. Number of pumps needing replacement ____________(p. 3-5)

k. Pump unit cost ($/pump) ____________

l. Pump cost ($)
Line 4j x Line 4k ____________

m. Number of wells needing tubing
replacement ____________

n. Length of tubing (ft/well) ____________

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* Based on a depth of 100 vertical lineal feet.

WORKSHEET G-4, PART 265 ONLY (page 4)

o. Tubing unit cost ($/ft) ______________ (p. 3-5)

p. Tubing replacement cost ($)
Line 4m x Line 4n x Line 4o ______________

q. Number of wells needing cap
replacement ______________

r. Well cap unit cost ($/cap) ______________

s. Well cap replacement cost ($)
Line 4q x Line 4r ______________

t. Monitoring well maintenance and
replacement cost ($)
Line 4d + Line 4h + Line 4i +
Line 4l + Line 4p + Line 4s ______________

5. Groundwater Monitoring Subtotal ($)
Line 1m + Line 2m + Line 3h + Line 4t ☐

WORKSHEET G-5

Inspection and Repairs

1. Inspection

   a. Time required for inspection by technician (hrs) ____________

   b. Technician unit labor cost ($/hr) ____________($20.50/hr; p. 9-3)

   c. Technician cost ($) Line 1a x Line 1b ____________

   d. Engineer time required (hrs) ____________

   e. Engineer unit labor cost ($/hr) ____________($45.50/hr; p. 9-3)

   f. Engineer cost ($) Line 1d x Line 1e ____________

   g. Clerical time required (hrs) ____________

   h. Clerical unit labor cost ($/hr) ____________($18/hr; p. 9-3)

   i. Clerical cost ($) Line 1g x Line 1h ____________

   j. Inspection subtotal ($) Line 1c + Line 1f + Line 1i ____________

2. Fence Installation or Repair

   a. Amount of fence to be installed or replaced (L.F.) ____________

   b. Fencing unit cost ($/L.F.) ____________($10.55/L.F.; p. 3-8)

   c. Fence cost ($) Line 2a x Line 2b ____________

   d. Number of gates needed ____________

   e. Gate unit cost ($/gate) ____________($80/gate; p. 3-8)

   f. Gate cost ($) Line 2d x Line 2e ____________

   g. Number of fence posts needed ____________

   h. Fence post unit cost ($/post) ____________($57/post; p. 3-8)

WORKSHEET G-5 (page 2)

i. Fence post cost ($)
Line 2g x Line 2h ____________

j. Fence installation/repair cost ($)
Line 2c + Line 2f + Line 2i ____________

3. Other Security Equipment Repair

a. Types of equipment needing
repair or replacement________________________

b. Number of items needing replacement ____________

c. Replacement unit cost ($/item) ____________(p. 3-8)

d. Security equipment replacement
cost ($)
Line 3b x Line 3c ____________

4. Inspection and Repairs Subtotal ($)
Line 1j + Line 2j + Line 3d ☐

WORKSHEET G-6

Testing for Soil Contamination

1. Background Samples and Samples with Potential Contamination

   a. Number of soil samples to be taken ______________

   b. Number of samples requiring coring through concrete/asphalt foundations/pads ______________

   c. Thickness of foundation/pad (inches) ______________

   d. Unit cost for coring through/removing concrete/asphalt foundations/pads ($/sample) ______________ ($15/inch; p. 6-1)

   e. Sample collection time required (hrs/sample) ______________ (1 hr/sample; p. 2-12)

   f. Transportation time to and from site (hrs) ______________

   g. Contract lab technician unit labor cost ($/hr) ______________ ($20.50/hr; p. 9-3)

   h. Sample collection time (hrs) (Line 1a x Line 1e) + Line 1f ______________

   i. Sampling cost ($) (Line 1b x Line 1c x Line 1d (Line 1g x Line 1h) ______________

   j. Contract lab fee ($/sample) ______________ (p. 2-13)

   k. Contract lab cost ($) Line 1a x Line 1j ______________

   l. Sample cost ($) Line 1i + Line 1k ______________

2. Preparation of Isogram Plan

   a. Engineer time required (hrs) ______________

   b. Engineer unit labor cost ($/hr) ______________ ($45.50/hr; p. 9-3)

   c. Engineer cost ($) Line 2a x Line 2b ______________

   d. Draftsperson time required (hrs) ______________

   e. Draftsperson unit labor cost ($/hr) ______________ ($24/hr; p. 9-3)

WORKSHEET G-6 (page 2)

f. Draftsperson cost ($)
Line 2d x Line 2e ________

g. Clerical time required (hrs) ________

h. Clerical unit labor cost ($/hr) ________($18/hr; p. 9-3)

i. Clerical cost ($)
Line 2g x Line 2h ________

j. Isogram plan cost ($)
Line 2c + Line 2f + Line 2i ________

3. Soil Testing Subtotal ($)
Line 1l + Line 2j ☐

WORKSHEET G-7

Decontamination

1. Protective Clothing and Safety Equipment for Facility Personnel

   a. Number of personnel requiring protective clothing and safety equipment for decontamination ____________

   b. Safety equipment and protective clothing unit cost ($/person) ____________ ($80/person; p. 5-6)

   c. Safety equipment and protective clothing cost ($) Line 1a x Line 1b ____________

2. Equipment Decontamination

   a. Equipment needing decontamination:

      - pumps and feed lines
      - heavy equipment (e.g., fork lifts, dozers, etc.)
      - other equipment (list)____________________

        ____

   b. Number of pumps and lines ____________

   c. Pumps and lines decontamination cost ($) ____________(p. 5-4)

   d. Residual generation rate for pump and line decontamination ____________(50 gal/pump and line; p. 5-1)

   e. Residual generated from pump and line decontamination (gal) Line 2b x Line 2d ____________

   f. Heavy equipment decontamination cost ($) ____________(p. 5-2)

   g. Total heavy equipment decontamination time (hrs) ____________(p. 5-2)

   h. Residual generation rate for heavy equipment decontamination (gal/hr) ____________(100 gal/hr; p. 5-1)

WORKSHEET G-7 (page 2)

i. Residual generated from heavy equipment decontamination (gal) Line 2g x Line 2h ____________

j. Equipment decontamination cost ($) Line 2c + Line 2f ____________

k. Contaminated fluid and/or residues generated (gal) Line 2e + Line 2i ____________

3. Tank Decontamination

a. Number of personnel entering tanks ____________

b. Additional personnel safety equipment unit cost ($/person) ____________($172/person; p. 5-6)

c. Additional personnel safety equipment cost ($) Line 3a x Line 3b ____________

d. Method of tank decontamination ______________

e. Tank area to be decontaminated (ft^2) ____________

f. Tank decontamination unit cost ($\$/ft^2$) ____________(p. 5-3)

g. Tank decontamination cost ($) Line 3e x Line 3f ____________

h. Tank decontamination subtotal before surcharge ($) Line 3c + Line 3g ____________

i. Surcharge factor (factor $\geq$1) ____________(2.0; p. 5-6)

j. Tank decontamination subtotal ($) Line 3h x (1 + Line 3i) ____________

k. Volume of tank(s) to be filled with sand (gal) ____________

WORKSHEET G-7 (page 3)

- l. Sand purchase and placement unit cost ($/gal) ______________ ($0.10/gal; p. 5-7)
- m. Tank decontamination and sand filling cost ($)
  Line 3j + (Line 3k x Line 3l) ______________
- n. Residual generation rate for tank decontamination (gal/ft^2) ______________ (p. 5-3)
- o. Contaminated fluid and/or residues generated (gal)
  Line 3e x Line 3n ______________

4. Pad or Foundation Decontamination

- a. Method of pad decontamination ______________
- b. Pad area to be decontaminated (ft^2) ______________
- c. Pad decontamination unit cost ($/ft^2) ______________ (p. 5-3)
- d. Pad decontamination subtotal ($)
  Line 4b x Line 4c ______________
- e. Residual generation rate for pad/foundation decontamination (gal/ft^2) ______________ (p. 5-3)
- f. Contaminated fluid and/or residues generated (gal)
  Line 4b x Line 4e ______________

5. Sump Decontamination

- a. Method of sump decontamination ______________
- b. Volume to be pumped from sump(s) (gal) ______________
- c. Time required for pumping (hrs)
  Line 5b ÷ 8000
  (round up to nearest integer) ______________
- d. Pumping unit cost ($/hr) ______________ ($23/hr; p. 4-11)

WORKSHEET G-7 (page 4)

e. Pump rental cost, optional ($/hr) ____________ ($2.70/hr; p. 4-11)

f. Pumping cost ($)
(Line 5c x Line 5d) + Line 5e ____________

g. Sump area to be decontaminated (ft^2) ____________

h. Sump decontamination unit cost ($\$/ft^2$) ____________ (p. 5-3)

i. Sump decontamination cost ($)
Line 5g x Line 5h ____________

j. Sump decontamination subtotal ($)
Line 5f + Line 5i ____________

k. Residual generation rate for sump decontamination (gal/ft^2) ____________ (p. 5-3)

l. Contaminated fluid and/or residues generated (gal)
Line 5b + (Line 5g x Line 5k) ____________

6. Container Rinsing

a. Number of containers ____________

b. Container rinsing time required (hrs)
0.083 x Line 6a ____________

c. Container rinsing unit cost ($/hr) ____________ ($32.75/hr; p. 5-10)

d. Container rinsing subtotal ($)
Line 6b x Line 6c ____________

e. Residual generation rate for container rinsing (gal/drum) ____________ (10 gal/drum; p. 5-10)

f. Contaminated fluid/residual generated (gal)
Line 6a x Line 6e ____________

7. Other Items Needing Decontamination

a. List items ____
____

WORKSHEET G-7 (page 5)

b. Method of decontamination for other items ______________________

c. Surface area of other items to be decontaminated (ft^2) ______________

d. Decontamination unit cost ($\$/ft^2$) ______________ (p. 5-3)

e. Decontamination of other items subtotal (\$) Line 7c x Line 7d ______________

f. Residual generation rate for decontamination of other items (gal/ft^2) ______________ (p. 5-3)

g. Contaminated fluid and/or residues generated (gal) Line 7c x Line 7f ______________

8. On-Site Treatment of Decontamination Residues

a. Quantity of residue to be treated (gal) ______________

b. Chemicals required for treatment (lb/gal residue or gal/gal residue) ______________ (pp. 4-12 - 4-13)

c. Chemicals unit cost (\$/lb or \$/gal) ______________

d. Chemicals cost (\$) Line 8a x Line 8b x Line 8c ______________

e. Electricity required for treatment (kwh/gal residue) ______________ (pp. 4-12 - 4-13)

f. Electricity unit cost (\$/kwh) ______________ (\$0.05/kwh; p. 4-2)

g. Electricity cost (\$) Line 8a x Line 8e x Line 8f ______________

h. Water required for treatment (gal/gal residue) ______________ (pp. 4-12 - 4-13)

i. Water unit cost (\$/1000 gal) ______________ (\$1.22/1000 gal; p. 4-2)

j. Water cost (\$) [(Line 8a x Line 8h) ÷ 1000] x Line 8i ______________

WORKSHEET G-7 (page 6)

k. Fuel required for treatment (MMBtu/gal residue) ____________ (pp. 4-12 - 4-13)

l. Fuel unit cost ($/MMBtu) ____________ (p. 4-2)

m. Fuel cost ($) Line 8a x Line 8k x Line 8l ____________

n. Labor required for treatment (hrs/gallon residue) ____________ (pp. 4-12 - 4-13)

o. Process operator unit labor cost ($/hr) ____________ ($26.50/hr; p. 9-3)

p. Labor cost ($) Line 8a x Line 8n x Line 8o ____________

q. On-site treatment cost ($) Line 8d + Line 8g + Line 8j + Line 8m + Line 8p ____________

r. Residue generated from treatment (gal) ____________

9. Testing for Success of Decontamination

a. Number of Samples ____________

b. Sample collection time required (hrs/sample) ____________

c. Technician unit labor cost ($/hr) ____________ ($20-50/hr; p. 9-3)

d. Sample collection time (hrs) Line 9a x Line 9b ____________

e. Sampling cost ($) Line 9c x Line 9d ____________

f. Cost to test each sample ($/sample) ____________ (pp. 5-10 - 5-11)

g. Testing cost ($) Line 9a x Line 9f ____________

h. Testing for success of decontamination cost ($) Line 9e + Line 9g ____________

WORKSHEET G-7 (page 7)

10. Treated Residue Discharge to Sewer

a. Volume of liquid discharged (gal) __________

b. Sewer discharge unit cost ($/1000 gal) __________ ($1.50/1000 gal; p. 4-2)

c. Sewer discharge cost ($) (Line 10a ÷ 1000) x Line 10b __________

11. Off-Site Management of Decontamination Fluid/Residues and/or Treatment Residue

a. Off-site management method __________

b. Quantity to be managed off-site (tons) __________*

c. Truck capacity (tons) __________

d. Number of loads
Line 11b ÷ Line 11c
(round up to nearest integer) __________

e. One-way distance (mi/load) __________

f. Transportation unit cost ($/mi) __________ ($4.50/mi; p. 4-15)**

g. Transportation cost ($)
Line 11d x Line 11e x Line 11f __________

h. Off-site management unit cost ($/ton) __________ (pp. 4-13 - 4-20)

i. Off-site management cost ($)
Line 11b x Line 11h __________

j. Contaminated fluid and residue disposal subtotal ($)
Line 11g + Line 11i __________

12. On-Site Disposal

Include volume on one or more worksheets:
Landfill Inventory - Line 1n, Line 1p
Incinerator Inventory - Line 1l, Line 1n
Land Treatment Inventory - Line 1k, Line 1o

---

* Conversion factors are provided in the Volume III appendix.

** Based on a 250-mile one-way distance.

WORKSHEET G-7 (page 8)

13. Facility Decontamination Subtotal ($)
Line 1c + Line 2j + Line 3m + Line 4d +
Line 5j + Line 6d + Line 7e + Line 8q +
Line 9h + Line 10c + Line 11j

WORKSHEET G-8

Removal of Contaminated Soil

1. Protective Clothing

   a. Number of personnel requiring protective clothing for excavation and decontaminating ____________

   b. Protective clothing unit cost ($/person) ____________($77/person; p. 6-8)

   c. Protective clothing cost ($) Line 1a x Line 1b ____________

2. Excavation of Contaminated Soil and Earthen Berms

   a. Volume of contaminated soil/berms to be removed (yd^3) ____________

   b. Excavation unit cost, including loading ($\$/yd^3$) ____________(pp. 6-3 - 6-7)

   c. Mobilization/demobilization cost ($) ____________(pp. 4-5, 4-7, 4-10, and 6-3)

   d. Contaminated soil/berm removal cost before surcharge ($) (Line 2a x Line 2b) + Line 2c ____________

   e. Surcharge factor ____________(1.0; pp. 6-8 - 6-9)

   f. Contaminated soil/berm removal subtotal ($) Line 2d x (1 + Line 2e) ____________

3. Equipment Decontamination

   a. Total heavy equipment decontamination time (hrs) ____________(p. 5-2)

   b. Heavy equipment decontamination cost ($) ____________ (p. 5-2)

   c. Residual generation rate for heavy equipment decontamination (gal/hr) ____________(100 gal/hr; p. 5-1)

   d. Contaminated fluid and/or residues generated (gal) Line 3a x Line 3c ____________

WORKSHEET G-8 (page 2)

4. On-Site Treatment of Decontamination Residues

   a. Quantity of residue to be treated (gal) ______________

   b. Chemicals required for treatment (lb/gal residue or gal/gal residue) ______________ (pp. 4-12 - 4-13)

   c. Chemicals unit cost ($/lb or $/gal) ______________

   d. Chemicals cost ($) Line 4a x Line 4b x Line 4c ______________

   e. Electricity required for treatment (kwh/gal residue) ______________ (pp. 4-12 - 4-13)

   f. Electricity unit cost ($/kwh) ______________ ($0.05/kwh; p. 4-2)

   g. Electricity cost ($) Line 4a x Line 4e x Line 4f ______________

   h. Water required for treatment (gal/gal residue) ______________ (pp. 4-12 - 4-13)

   i. Water unit cost ($/1000 gal) ______________ ($1.22/1000 gal; p. 4-2)

   j. Water cost ($) [(Line 4a x Line 4h) ÷ 1000] x Line 4i ______________

   k. Fuel required for treatment (MMBtu/gal residue) ______________ (pp. 4-12 - 4-13)

   l. Fuel unit cost ($/MMBtu) ______________ (p. 4-2)

   m. Fuel cost ($) Line 4a x Line 4k x Line 4l ______________

   n. Labor required for treatment (hrs/gallon residue) ______________ (pp. 4-12 - 4-13)

   o. Process operator unit labor cost ($/hr) ______________ ($26.50/hr; p. 9-3)

   p. Labor cost ($) Line 4a x Line 4n x Line 4o ______________

WORKSHEET G-8 (page 3)

q. On-site treatment cost ($)
Line 4d + Line 4g + Line 4j +
Line 4m + Line 4p ______________

r. Residue generated from treatment
(gal) ______________

5. Treated Residue Discharge to Sewer

a. Volume of liquid discharged (gal) ______________

b. Sewer discharge unit cost
($/1000 gal) ______________ ($1.50/1000 gal; p. 4-2)

c. Sewer discharge cost ($)
(Line 5a ÷ 1000) x Line 5b ______________

6. Off-Site Management of Contaminated Soil, Decontamination Residue, and/or Treatment Residue

a. Quantity to be managed off-site
(tons) ______________*

b. Truck capacity (tons) ______________

c. Number of loads
Line 6a ÷ Line 6b
(round up to nearest integer) ______________

d. One-way distance (mi/load) ______________

e. Transportation unit cost ($/mi) ______________($4.50/mi; p. 4-15)**

f. Transportation cost ($)
Line 6c x Line 6d x Line 6e ______________

g. Off-site management unit
cost ($/ton) ______________(pp. 4-13 - 4-20)

h. Off-site management cost ($)
Line 6a x Line 6g ______________

i. Off-site management subtotal ($)
Line 6f + Line 6h ______________

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* Conversion factors are provided in the Volume III appendix.

** Based on a 250-mile one-way distance.

WORKSHEET G-8 (page 4)

7. On-Site Disposal

Include volume on one or more worksheets:
Landfill Inventory - Line 1n, Line 1o, Line 1p
Incinerator Inventory - Line 1l, Line 1n, Line 1o
Land Treatment Inventory - Line 1k, Line 1l, Line 1o

8. Contaminated Soil Removal Subtotal ($)
Line 1c + Line 2f + Line 3b + Line 4q +
Line 5c + Line 6i

WORKSHEET G-9

Final Cover

1. Native Soil for Slope and Fill

   a. Length of area to be capped (yd) ____________

   b. Width of area to be capped (yd) ____________

   c. Quantity needed (yd^3) ____________(*)

   d. Excavation unit cost ($/$yd^3$) ____________

   e. Placement and spreading unit cost ($/$yd^3$) ____________($2.48/yd^3; p. 7-6)

   f. Compaction unit cost ($/$yd^3$) ____________($2.25/yd^3; p. 7-6)

   g. Total native soil unit cost ($/$yd^3$) Line 1d + Line 1e + Line 1f ____________($1.04/$yd^3$; p. 7-6)

   h. Percent compaction (decimal < 1) ____________(0.25; p. 7-10)

   i. Native soil cost ($) Line 1c x Line 1g x (1 + Line 1h) ____________

2. On-Site Clay

   a. Area to be capped (yd^2) Line 1a x Line 1b ____________

   b. Depth of clay needed (yd) ____________

   c. Quantity needed (yd^3) Line 2a x Line 2b ____________

   d. Excavation unit cost ($/$yd^3$) ____________($4.05/yd^3; p. 7-10)

   e. Placement/spreading unit cost ($/$yd^3$) ____________($2.25/yd^3; p. 7-10)

   f. Compaction unit cost ($/$yd^3$) ____________($2.41/yd^3; p. 7-10)

   g. Total on-site clay unit cost ($/$yd^3$) Line 2d + Line 2e + Line 2f ____________($8.71/$yd^3$; pp. 7-10 - 7-11)

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* Formula provided in Final Cover and Revegetation chapter of Volume III.

WORKSHEET G-9 (page 2)

h. Percent compaction (decimal < 1) ______________ (0.25; p. 7-10)

i. Clay lift thickness (yd) ______________ (0.22 yd; p. 7-12)

j. Number of lifts
Line 2b ÷ Line 2i ______________

k. Number of samples to be tested/lift (samples/lift) ______________ (3 samples/lift; p. 7-12)

l. Number of samples to be tested
Line 2j x Line 2k ______________

m. Clay testing unit cost ($/sample) ______________ ($230/sample; p. 7-12)

n. Clay testing cost
Line 2l x Line 2m ______________

o. On-site clay cost ($)
Line 2c x Line 2g x (1 + Line 2h) + Line 2n ______________

3. Off-Site Clay

a. Area to be capped (yd^2)
Line 1a x Line 1b ______________

b. Depth of clay needed (yd) ______________ (0.67 yd; p. 7-4)

c. Quantity needed (yd^3)
Line 3a x Line 3b ______________

d. Purchase unit cost ($/yd^3) ______________ ($4.75/yd^3; p. 7-13)

e. Delivery unit cost ($/yd^3) ______________ ($10.16/yd^3; p. 7-13)

f. Spreading unit cost ($/yd^3) ______________ ($1.03/yd^3; p. 7-13)

g. Compaction unit cost ($/yd^3) ______________ ($2.41/yd^3; p. 7-13)

h. Total off-site clay unit cost ($/yd^3)
Line 3d + Line 3e + Line 3f + Line 3g ______________ ($18.35/yd^3; pp. 7-13 - 7-14)

i. Percent compaction (decimal < 1) ______________ (0.40; p. 7-10)

j. Clay lift thickness (yd) ______________ (0.22 yd; p. 7-12)

WORKSHEET G-9 (page 3)

k. Number of lifts
Line 3b ÷ Line 3j ____________

l. Number of samples to be tested/lift (samples/lift) ____________ (3 samples/lift; p. 7-12)

m. Number of samples to be tested
Line 3k x Line 3l ____________

n. Clay testing unit cost ($/sample) ____________ ($230/sample; p. 7-12)

o. Clay testing cost
Line 3m x Line 3n ____________

p. Off-site clay cost ($)
Line 3c x Line 3h x (1 + Line 3i) + Line 3o ____________

4. Synthetic Membrane

a. Type of membrane ______________________

b. Quantity needed (yd^2) ____________

c. Purchase unit cost ($/yd^2) ____________ ($2.60/yd^2; p. 7-16)

d. Delivery unit cost ($/yd^2) ____________ ($0.25/yd^2; p. 7-16)

e. Installation unit cost ($/yd^2) ____________ ($0.50/yd^2; p. 7-16)

f. Total synthetic membrane unit cost ($/yd^2)
Line 4c + Line 4d + Line 4e ____________ ($3.35/yd^2; p. 7-16)

g. Synthetic liner testing (percent of total synthetic membrane unit cost) ____________ (0.25; p. 7-15)

h. Synthetic membrane cost ($)
Line 4b x Line 4f x (1 + Line 4g) ____________

5. Sand

a. Area to be capped (yd^2)
Line 1a x Line 1b ____________

b. Depth of sand needed (yd) ____________ (0.33 yd; p. 7-4)

WORKSHEET G-9 (page 4)

c. Quantity needed (yd^3)
Line 5a x Line 5b ________

d. Purchase unit cost ($\$/yd^3$) ________ ($5.50/yd^3; p. 7-20)

e. Delivery unit cost ($\$/yd^3$) ________ ($2.61/yd^3; p. 7-20)

f. Spreading unit cost ($\$/yd^3$) ________ ($1.03/yd^3; p. 7-20)

g. Compaction unit cost ($\$/yd^3$) ________ ($1.49/yd^3; p. 7-20)

h. Total sand unit cost ($\$/yd^3$)
Line 5d + Line 5e + Line 5f
+ Line 5g ________ ($10.63/$yd^3$; pp. 7-20 - 7-21)

i. Percent compaction (decimal < 1) ________ (0.10; p. 7-10)

j. Sand cost ($)
Line 5c x Line 5h x (1 + Line 5i) ________

6. Gravel

a. Area to be capped (yd^2)
Line 1a x Line 1b ________

b. Depth of gravel needed (yd) ________ (0.33 yd; p. 7-4)

c. Quantity needed (yd^3)
Line 6a x Line 6b ________

d. Purchase unit cost ($\$/yd^3$) ________ ($3.85/yd^3; p. 7-17)

e. Delivery unit cost ($\$/yd^3$) ________ ($2.61/yd^3; p. 7-17)

f. Spreading unit cost ($\$/yd^3$) ________ ($1.03/yd^3; p. 7-17)

g. Compaction unit cost ($\$/yd^3$) ________ ($1.22/yd^3; p. 7-17)

h. Total gravel unit cost ($\$/yd^3$)
Line 6d + Line 6e + Line 6f
+ Line 6g ________ ($8.71/$yd^3$; pp. 7-17 - 7-18)

i. Percent compaction (decimal < 1) ________ (0.05; p. 7-10)

j. Gravel cost ($)
Line 6c x Line 6h x (1 + Line 6i) ________

WORKSHEET G-9 (page 5)

7. Drainage Tile

   a. Type of tile ______________________________

   b. Length needed (L.F.) ____________

   c. Tile unit cost ($/L.F.) ____________ ($0.50/L.F.; p. 7-22)

   d. Trenching and backfilling unit cost ($/L.F.) ____________ ($0.56/L.F.; p. 7-22)

   e. Total drainage tile unit cost ($/L.F.)
   Line 7c + Line 7d ____________ ($1.06/L.F.; pp. 7-22 - 7-23)

   f. Drainage tile cost ($)
   Line 7b x Line 7e ____________

8. Geotextile Filter Fabric

   a. Type of geotextile ______________________________

   b. Quantity needed (yd^2) ____________

   c. Purchase unit cost ($/yd^2) ____________ ($0.69/yd^2; p. 7-24)

   d. Delivery unit cost ($/yd^2) ____________ ($0.05/yd^2; p. 7-24)

   e. Installation unit cost ($/yd^2) ____________ ($0.09/yd^2; p. 7-24)

   f. Total geotextile filter fabric unit cost ($/yd^2)
   Line 8c + Line 8d + Line 8e ____________ ($0.83/yd^2; p. 7-24)

   g. Geotextile filter fabric cost ($)
   Line 8b x Line 8f ____________

9. Topsoil

   a. Area to be capped (yd^2)
   Line 1a x Line 1b ____________

   b. Depth of topsoil needed (yd) ____________ (0.67 yd; p. 7-4)

   c. Quantity needed (yd^3)
   Line 9a x Line 9b ____________

   d. Purchase unit cost ($/yd^3) ____________ ($6.56/yd^3; p. 7-26)

   e. Delivery unit cost ($/yd^3) ____________ ($2.61/yd^3; p. 7-26)

WORKSHEET G-9 (page 6)

f. Spreading unit cost ($/yd^3) __________ ($1.03/yd^3; p. 7-26)

g. Compaction unit cost ($/yd^3) __________ ($1.22/yd^3; p. 7-26)

h. Total topsoil unit cost ($/yd^3)
Line 9d + Line 9e + Line 9f +
Line 9g __________ ($11.42/yd^3; p. 7-26 - 7-27)

i. Percent compaction (decimal < 1) __________ (0.25; p. 7-10)

j. Topsoil cost ($)
Line 9c x Line 9h x (1 + Line 9i) __________

10. Crushed Stone

a. Area to be capped (yd^2)
Line 1a x Line 1b __________

b. Depth of crushed stone needed (yd) __________ (0.33 yd; p. 7-4)

c. Quantity needed (yd^3)
Line 10a x Line 10b __________

d. Purchase unit cost ($/yd^3) __________ ($11.55/yd^3; p. 7-28)

e. Delivery unit cost ($/yd^3) __________ ($2.61/yd^3; p. 7-28)

f. Spreading unit cost ($/yd^3) __________ ($1.03/yd^3; p. 7-28)

g. Compaction unit cost ($/yd^3) __________ ($1.22/yd^3; p. 7-28)

h. Total crushed stone unit cost ($/yd^3)
Line 10d + Line 10e + Line 10f
+ Line 10g __________ ($16.41/yd^3; pp. 7-28 - 7-29)

i. Percent compaction (decimal < 1) __________ (0.05; p. 7-10)

j. Crushed stone cost ($)
Line 10c x Line 10h x (1 + Line 10i) __________

11. Mobilization/Demobilization

a. Heavy equipment mobilization/demobilization cost ($) __________ ($700; p. 7-32)

12. Final Cover Subtotal ($)
Line 1i + Line 2o + Line 3p + Line 4h
+ Line 5j + Line 6j + Line 7f
+ Line 8g + Line 9j + Line 10j
+ Line 11a

WORKSHEET G-10

Revegetation

1. Soil Preparation and Grading

    a. Area to be revegetated, including closed area that needs replanting (acres) ____________

    b. Soil preparation and grading unit cost ($/acre) ____________ ($1002/acre; p. 7-31)

    c. Soil preparation and grading cost ($)
    Line 1a x Line 1b ____________

2. Seeding

    a. Type of vegetation ______________________

    b. Seed unit cost ($/acre) ____________ ($795/acre; p. 7-31)

    c. Seed cost ($)
    Line 1a x Line 2b ____________

3. Fertilizing

    a. Type of fertilizer ______________________

    b. Fertilizer unit cost ($/acre) ____________ ($176/acre; p. 7-31)

    c. Fertilizing cost ($)
    Line 1a x Line 3b ____________

4. Mulching

    a. Mulch unit cost ($/acre) ____________ ($1048/acre; p. 7-31)

    b. Mulching cost ($)
    Line 1a x Line 4a ____________

5. Mobilization/Demobilization

    a. Heavy equipment mobilization/demobilization cost ($) ____________ ($105; p. 7-32)

6. Revegetation Subtotal ($)
Line 1c + Line 2c + Line 3c + Line 4b + Line 5a ☐

WORKSHEET G-11

Certification of Partial Closures (if Applicable)

1. Independent Registered Professional Engineer

   a. Initial review of closure plan (hrs) __________ (4 hrs; p. 8-4)

   b. Total number of inspections for all partial closures __________

   c. Inspection time required (hrs/inspection) __________ (p. 8-3)

   d. Inspection time required (hrs) Line 1b x Line 1c __________

   e. Prepare final documentation (hrs) __________ (4 hrs; p. 8-4)

   f. Total professional engineer time required (hrs) Line 1a + Line 1d + Line 1e __________

   g. Professional engineer unit labor cost ($/hr) __________ ($45.50/hr; p. 8-3)

   h. Professional engineer cost ($) Line 1f x Line 1g __________

2. Clerical*

   a. Number of weeks for all partial closures __________

   b. Clerical time required (hrs/wk) __________ (2 hrs/wk; p. 8-3)

   c. Clerical unit labor cost ($/hr) __________ ($18/hr; p. 8-3)

   d. Clerical cost ($) Line 2a x Line 2b x Line 2c __________

3. Certification of Partial Closures Subtotal ($) Line 1h + Line 2d ☐

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* Clerical time should be included only if the Professional Engineer is operating independently in a single-person business.

WORKSHEET G-12

Survey Plat - Partial Closures

1. Surveying of Waste Management Area Boundaries

    a. Number of separate partial closures ________

    b. Land surveying team time required (hrs/partial closure) ________

    c. Land surveying team unit labor cost ($/hr) ________ ($75/hr; p. 9-3)

    d. Land surveying cost ($) Line 1a x Line 1b x Line 1c ________

2. Fence Posts to Mark Boundaries

    a. Number of fence posts for all partial closures ________

    b. Fence post unit cost ($/post) ________ ($29/post; p. 3-7)

    c. Fence post cost ($) Line 2a x Line 2b ________

3. Plat Submittal

    a. Attorney time required (hrs/partial closure) ________

    b. Attorney unit labor cost ($/hr) ________ ($100/hr; p. 9-3)

    c. Attorney cost ($) Line 1a x Line 3a x Line 3b ________

    d. Clerical time required (hrs/partial closure) ________

    e. Clerical unit labor cost ($/hr) ________ ($18/hr; p. 9-3)

    f. Clerical cost ($) Line 1a x Line 3d x Line 3e ________

    g. Plat submittal cost ($) Line 3c + Line 3f ________

4. Notice to Local Land Authority Subtotal ($) Line 1d + Line 2c + Line 3g ☐

WORKSHEET G-13

Certification of Final Closure

1. Independent Registered Professional Engineer
   - a. Initial review of closure plan (hrs) ______________ (8 hrs; p. 8-4)
   - b. Inspection frequency (inspections/wk) ______________ (p. 8-3)
   - c. Inspection time required (hrs/inspection) ______________ (p. 8-3)
   - d. Number of weeks for closure (wks) ______________
   - e. Inspection time required (hrs) Line 1b x Line 1c x Line 1d ______________
   - f. Prepare final documentation (hrs) ______________ (4 hrs; p. 8-4)
   - g. Total professional engineer time required (hrs) Line 1a + Line 1e + Line 1f ______________
   - h. Professional engineer unit labor cost ($/hr) ______________ ($45.50/hr; p. 8-3)
   - i. Professional engineer cost ($) Line 1g x Line 1h ______________

2. Clerical*
   - a. Clerical time required (hrs/wk) ______________ (2 hrs/wk; p. 8-3)
   - b. Clerical unit labor cost ($/hr) ______________ ($18/hr; p. 8-3)
   - c. Clerical cost ($) Line 1d x Line 2a x Line 2b ______________

3. Certification of Closure Subtotal ($) Line 1i + Line 2c ☐

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* Clerical time should be included only if the Professional Engineer is operating independently in a single-person business.

WORKSHEET G-14

Survey Plat - Final Closure

1. Surveying of Waste Management Area Boundaries

   a. Land surveying team time required (hrs) ______________

   b. Land surveying team unit labor cost ($/hr) ______________ ($75/hr; p. 9-3)

   c. Land surveying cost ($) Line 1a x Line 1b ______________

2. Fence Posts to Mark Boundaries

   a. Number of fence posts ______________

   b. Fence post unit cost ($/post) ______________ ($29/post; p. 3-7)

   c. Fence post cost ($) Line 2a x Line 2b ______________

3. Plat Submittal

   a. Attorney time required (hrs) ______________

   b. Attorney unit labor cost ($/hr) ______________ ($100/hr; p. 9-3)

   c. Attorney cost ($) Line 3a x Line 3b ______________

   d. Clerical time required (hrs) ______________

   e. Clerical unit labor cost ($/hr) ______________ ($18/hr; p. 9-3)

   f. Clerical cost ($) Line 3d x Line 3e ______________

   g. Plat submittal cost ($) Line 3c + Line 3f ______________

4. Notice to Local Land Authority Subtotal ($) Line 1c + Line 2c + Line 3g ☐

CHAPTER 6

POST-CLOSURE

The chapter contains the worksheets for estimating Part 264 or Part 265 post-closure costs. The post-closure care regulations apply to all disposal facilities. These include:

- all landfills;
- all land treatment facilities;
- all surface impoundments at which the facility owner/operator intends to leave waste after closure; and
- all permitted surface impoundments and waste piles at which wastes are to be removed at closure and that do not meet Part 264 liner requirements.

The cost estimates for this last group of facilities are the contingent post-closure cost estimates. The post-closure worksheets are as follows:

- Worksheet H-1 (Notation on Property Deed - Partial Closures)
- Worksheet H-2 (Notation on Property Deed - Final Closure)
- Worksheet H-3 (Maintenance of Waste Management Area Boundaries)
- Worksheet H-4 (Facility Inspection)
- Worksheet H-5 (Routine Maintenance and Repairs)
- Worksheet H-6 (Severe Erosion Damage Repair)
- Worksheet H-7 (Leachate Management)
- Worksheet H-8 (Groundwater Monitoring)
- Worksheet H-9 (Gas Monitoring)
- Worksheet H-10 (Soil Monitoring)
- Worksheet H-11 (Demonstration for Exemption from Post-Closure Care Activities for Land Treatment Units)
- Worksheet H-12 (Certification of Post-Closure)

Worksheets H-1 through H-6 and H-10 and H-12 apply to all post-closure cost estimates. The costs for submittal of the waste record and the notation on the property deed (Worksheets H-1 and H-2) are the first costs incurred after closure is completed. These costs are sometimes included in the closure cost estimate. Worksheet H-7 applies to those facilities with leachate collection and/or leak detection systems, and Worksheet H-8 applies to facilities that have a groundwater monitoring program in place at the time of closure. Worksheets H-9 and H-10 apply to landfills and land treatment facilities, respectively. Qoeksheet H-11 applies to land treatment units only. If the owner or operator of a land treatment facility can demonstrate that the hazardous constituents in the treatment zone have degraded before the end of the 30-year post-closure care period, the owner or operator can become exempt for the remainder of the post-closure care period. Worksheet H-11 would be used to estimate the demonstration cost.

Sections 264.117(a) and 265.117(a) of 40 CFR state that the post-closure care period begins after completion of each unit and must continue for 30 years. However, Sections 264.117(a) and 265.117(a) of 40 CFR further state that the Regional Administrator may lengthen or shorten the post-closure care period for a facility at any time. The post-closure cost estimate for each unit must include both the annual costs multiplied by the number of years of post-closure care and the sum of the periodic costs. A 30 year post-closure care period was assumed for the worksheets. If the post-closure period is lengthened or shortened, the user should adjust the worksheet. The post-closure worksheets address the following items:

- Notation on Property Deed - Partial Closures

  1. Attorney
  2. Clerical
  3. Waste record submittal

- Notation on Property Deed - Final Closure

  1. Attorney
  2. Clerical

3. Waste record submittal

- Maintenance of Waste Management Area Boundaries

    1. Post maintenance

- Facility Inspection

    1. Engineer
    2. Technician
    3. Clerical

- Routine Maintenance and Repairs

    1. Mowing
    2. Fertilizing
    3. Sprinkling or irrigation
    4. Re-establishment of vegetative cover
    5. Routine erosion damage repair of vegetative or crushed stone cover, dikes, and berms
    6. Security system maintenance and repair
    7. Diversion ditch cleaning
    8. Diversion ditch repair
    9. Rodent control
    10. Maintaining pH (land treatment only)

- Severe Erosion Damage Repair

    1. Soil acquisition (on-site soil)
    2. Soil acquisition (off-site soil)
    3. Heavy equipment mobilization/demobilization
    4. Revegetation

- Leachate Management

  1. Leachate collection
  2. On-site treatment of leachate*
  3. Treated leachate discharge to sewer
  4. Off-site management of leachate and/or treatment residue
  5. Solidification prior to on-site landfill disposal
  6. On-site disposal*
  7. Leachate collection system inspection
  8. Leachate collection system maintenance
  9. Leak detection system inspection
  10. Leak detection system maintenance

- Groundwater Monitoring - Part 264 Only

  1. Detection monitoring - background/upgradient wells
  2. Detection monitoring - compliance point/downgradient wells
  3. Compliance monitoring - background/upgradient wells
  4. Compliance monitoring - for selected hazardous constituents at compliance point/downgradient wells
  5. Compliance monitoring - for Appendix VIII constituents at compliance point/downgradient wells
  6. Monitoring well inspection
  7. Monitoring well maintenance
  8. Monitoring well and parts replacement

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* On-site treatment or disposal of leachate can be done during post-closure only if final closure has not occurred.

- Groundwater Monitoring - Part 265 Only

    1. Primary drinking water parameters analysis - background/upgradient and downgradient wells
    2. Groundwater quality analysis - background/upgradient and downgradient wells
    3. Groundwater quality analysis - upgradient and downgradient wells
    4. Groundwater contamination analysis - background/upgradient and downgradient wells
    5. Groundwater contamination analysis - upgradient and downgradient wells
    6. Monitoring well inspection
    7. Monitoring well maintenance
    8. Monitoring well and parts replacement

- Gas Monitoring

    1. Monitoring
    2. Gas monitoring well inspection
    3. Gas monitoring well maintenance

- Soil Monitoring

    1. Soil core monitoring

- Demonstration for Exemption from Post-Closure Care Activities for Land Treatment Units

    1. Soil sampling
    2. Statistical evaluation

- Certification of Post-Closure

    1. Independent registered professional engineer
    2. Clerical

WORKSHEET H-1

Notation on Property Deed - Partial Closure (First Unit)

1. Attorney

   a. Number of separate partial closures ______________

   b. Attorney time required (hrs) ______________

   c. Attorney unit labor cost ($/hr) ______________($100/hr; p. 111)

   d. Attorney cost ($)
   Line 1a x Line 1b x Line 1c ______________

2. Clerical

   a. Clerical time required (hrs) ______________

   b. Clerical unit labor cost ($/hr) ______________($18/hr; p. 111)

   c. Clerical cost ($)
   Line 1a x Line 2a x Line 2b ______________

   d. Filing fee ($) ______________

   e. Clerical subtotal
   Line 2c + Line 2d ______________

3. Waste Record Submittal

   a. Engineer time required (hrs) ______________

   b. Engineer unit labor cost ($/hr) ______________($45.50/hr; p. 111)

   c. Engineer cost ($)
   Line 1a x Line 3a x Line 3b ______________

   d. Clerical time required (hrs) ______________

   e. Clerical unit labor cost ($/hr) ______________($18/hr; p. 111)

   f. Clerical cost ($)
   Line 1a x Line 3d x Line 3e ______________

   g. Waste record submittal cost ($)
   Line 3c + Line 3f ______________

4. Notation on Property Deed Subtotal ($)
   Line 1d + Line 2e + Line 3g ☐

WORKSHEET H-2

Notation on Property Deed - Final Closure

1. Attorney
   - a. Attorney time required (hrs) __________
   - b. Attorney unit labor cost ($/hr) __________($100/hr; p. 9-4)
   - c. Attorney cost ($)
     Line 1a x Line 1b __________

2. Clerical
   - a. Clerical time required (hrs) __________
   - b. Clerical unit labor cost ($/hr) __________($18/hr; p. 9-4)
   - c. Clerical cost ($)
     Line 2a x Line 2b __________
   - d. Filing fee ($) __________
   - e. Clerical subtotal
     Line 2c + Line 2d __________

3. Waste Record Submittal
   - a. Engineer time required (hrs) __________
   - b. Engineer unit labor cost ($/hr) __________($45.50/hr; p. 9-4)
   - c. Engineer cost ($)
     Line 3a x Line 3b __________
   - d. Clerical time required (hrs) __________
   - e. Clerical unit labor cost ($/hr) __________($18/hr; p. 9-4)
   - f. Clerical cost ($)
     Line 3d x Line 3e __________
   - g. Waste record submittal cost ($)
     Line 3c + Line 3f __________

4. Notation on Property Deed Subtotal ($)
   Line 1c + Line 2e + Line 3g ☐

WORKSHEET H-3

Maintenance of Waste Management Area Boundaries

1. Post Maintenance

   a. Number of replacement posts during post-closure period (posts/30 yrs) ________

   b. Post unit cost ($/post) ________($29/post; p. 3-7)

   c. Post maintenance cost ($) Line 1a x Line 1b ________

2. Maintenance of Waste Management Area Boundaries Subtotal ($) Line 1c ☐

WORKSHEET H-4

Facility Inspection

1. Engineer

   a. Number of inspections during post-closure period (inspections/30 years) ____________

   b. Engineer time required (hrs/insp) ____________

   c. Engineer unit labor cost ($/hr) ____________ ($45.50/hr; p. 9-4)

   d. Engineer cost ($)
   Line 1a x Line 1b x Line 1c ____________

2. Technician

   a. Technician time required (hrs/insp) ____________

   b. Technician unit labor cost ($/hr) ____________ ($20.50/hr; p. 9-4)

   c. Technician cost ($)
   Line 1a x Line 2a x Line 2b ____________

3. Clerical

   a. Clerical time required (hrs/insp) ____________

   b. Clerical unit labor cost ($/hr) ____________ ($18/hr; p. 9-4)

   c. Clerical cost ($)
   Line 1a x Line 3a x Line 3b ____________

4. Facility Inspection Subtotal ($)
   Line 1d + Line 2c + Line 3c

WORKSHEET H-5

Routine Maintenance and Repairs

1. Mowing

    a. Mowing frequency (visits/30 yrs) ____________

    b. Area to be mowed per visit (acres/visit) ____________

    c. Mowing unit cost ($/acre) ____________ ($25/acre; p. 3-9)

    d. Mowing cost ($) Line 1a x Line 1b x Line 1c ____________

2. Fertilizing

    a. Fertilizing frequency (visits/30 yrs) ____________

    b. Area to be fertilized (acres/visit) ____________

    c. Fertilizer unit cost ($/acre) ____________ ($176/acre; p. 3-9)

    d. Mobilization/demobiliation cost ($/visit) ____________ ($105/visit; p. 3-9)

    e. Fertilizing cost ($) (Line 2a x Line 2b x Line 2c) + (Line 2a x Line 2d) ____________

3. Sprinkling or Irrigation

    a. Sprinkling frequency (days/30 yrs) ____________

    b. Sprinkling unit cost ($/day) ____________ ($420/day; p. 3-9)

    c. Sprinkling cost ($) Line 3a x Line 3b ____________

4. Re-establishment of Vegetative Cover

    a. Number of visits (visits/30 yrs) ____________

WORKSHEET H-5 (page 2)

b. Area requiring re-establishment of vegetation per visit (acres/visit) ____________

c. Seed unit cost ($/acre) ____________ ($1155/acre; p. 3-11)

d. Seeding cost ($)
Line 4a x Line 4b x Line 4c

e. Fertilizer unit cost ($/acre) ____________ ($290/acre; p. 3-11)

f. Fertilizing cost ($)
Line 4a x Line 4b x Line 4e ____________

g. Re-establishment of cover ($)
Line 4d + Line 4f ____________

5. Routine Erosion Damage Repair of Vegetative or Crushed Stone Cover, Dikes, and Berms (if applicable)

a. Repairing frequency (visits/30 yrs) ____________

b. Quantity of soil required (yd^3/visit) ____________

c. Time required for excavation and transportation of on-site soil (hrs/visit) ____________

d. Unit labor cost ($/hr) ____________ ($23/hr; p. 9-4)

e. On-site soil cost ($)
Line 5a x Line 5c x Line 5d ____________

f. Off-site soil unit cost ($/$yd^3$) ____________ ($17.60/yd^3; p. 3-12)*

g. Off-site soil cost ($)
Line 5a x Line 5b x Line 5f ____________

h. Time required for soil placement (hrs/visit) ____________

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* Based on a 5-mile haul distance.

WORKSHEET H-5 (page 3)

i. Soil placement cost ($)
Line 5a x Line 5d x Line 5h ____________

j. Area to be seeded, fertilized, and mulched (acres/visit) ____________

k. Seed unit cost ($/acre) ____________ ($1334/acre; p. 3-11)

l. Seeding cost ($)
Line 5a x Line 5j x Line 5k ____________

m. Fertilizer unit cost ($/acre) ____________ ($290/acre; p. 3-11)

n. Fertilizing cost ($)
Line 5a x Line 5j x Line 5m ____________

o. Mulch unit cost ($/acre) ____________ ($2904/acre; p. 3-11)

p. Mulching cost ($)
Line 5a x Line 5j x Line 5o ____________

q. Quantity of crushed stone required (yd^3/visit) ____________

r. Purchase unit cost ($/yd^3) ____________ ($11.55/yd^3; p. 3-11)

s. Delivery unit cost ($/yd^3) ____________ ($2.61/yd^3; p. 3-11)

t. Spreading unit cost ($/yd^3) ____________ ($15.35/yd^3; p. 3-11)

u. Compaction unit cost ($/yd^3) ____________ ($4.14/yd^3; p. 3-11)

v. Total crushed stone unit cost ($/yd^3)
Line 5r + Line 5s + Line 5t + Line 5u ____________

w. Crushed stone cost ($)
Line 5a x Line 5q x Line 5v ____________

x. Erosion damage repair subtotal ($)
Line 5e + Line 5g + Line 5i + Line 5l + Line 5n + Line 5p + Line 5w ____________

WORKSHEET H-5 (page 4)

6. Security System Maintenance and Repair

   a. Security system maintenance frequency (visits/30 yrs) ____________

   b. Amount of fence needing replacement (L.F./visit) ____________

   c. Fencing unit cost ($/L.F.) ____________($10.55/L.F.; p. 3-8)

   d. Fence cost ($)
   Line 6a x Line 6b x Line 6c ____________

   e. Number of replacement gates (gates/visit) ____________

   f. Gate unit cost ($/gate) ____________($80/gate; p. 3-8)

   g. Gate replacement cost ($)
   Line 6a x Line 6e x Line 6f ____________

   h. Number of replacement posts (posts/visit) ____________

   i. Post unit cost ($/post) ____________($57/post; p. 3-8)

   j. Post replacement cost ($)
   Line 6a x Line 6h x Line 6i ____________

   k. Number of other security items needing replacement (items/visit) ____________

   l. Other security items unit cost ($/item) ____________(p. 3-8)

   m. Other security items replacement cost ($)
   Line 6a x Line 6k x Line 6l ____________

   n. Security repair subtotal ($)
   Line 6d + Line 6g + Line 6j
   + Line 6m ____________

7. Diversion Ditch Cleaning

   a. Diversion ditch cleaning frequency (visits/30yrs) ____________

   b. Length of diversion ditch (L.F./visit) ____________

WORKSHEET H-5 (page 5)

c. Cleaning time required (hrs/L.F.) __________

d. Unit labor cost ($/hr) __________($23/hr; p. 9-4)

e. Diversion ditch cleaning cost ($)
Line 7a x Line 7b x Line 7c
x Line 7d __________

8. Diversion Ditch Repair

a. Diversion ditch repair frequency
(visits/30 yrs) __________

b. Quantity of soil required
(yd^3/visit) __________

c. Off-site soil unit cost ($/$yd^3$) __________($17.60/yd^3; p. 3-12)*

d. Off-site soil cost ($)
Line 8a x Line 8b x Line 8c __________

e. Area to be seeded, fertilized,
and mulched (acres/visit) __________

f. Seed unit cost ($/acre) __________($1334/acre; p. 3-11)

g. Seeding cost ($)
Line 8a x Line 8e x Line 8f __________

h. Fertilizer unit cost ($/acre) __________($290/acre; p. 3-11)

i. Fertilizing cost ($)
Line 8a x Line 8e x Line 8h __________

j. Mulch unit cost ($/acre) __________($2904/acre; p. 3-11)

k. Mulching cost ($)
Line 8a x Line 8e x Line 8j __________

l. Diversion ditch repair subtotal ($)
Line 8d + Line 8g + Line 8i
+ Line 8k __________

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* Based on a 5-mile haul distance.

WORKSHEET H-5 (page 6)

9. Rodent Control

   a. Rodent control frequency (visits/30 yrs) ______________

   b. Area requiring rodent control (acres/visit) ______________

   c. Rodent control unit cost ($/acre) ______________($30/acre; p. 3-12)

   d. Application time required (hrs/visit) ______________

   e. Unit labor cost ($/hr) ______________($23/hr; p. 9-4)

   f. Rodent control cost ($)
   (Line 9a x Line 9b x Line 9c)
   + (Line 9a x Line 9d x Line 9e) ______________

10. Maintaining pH (Land Treatment Only)

   a. pH maintenance frequency - supplementary applications (visits/30 years) ______________

   b. Land treatment area (acres/visit) ______________

   c. Lime unit cost - initial application ($/acre) ______________($214/acre; p. 3-13)

   d. Lime cost - initial application ($)
   Line 10b x Line 10c ______________

   e. Lime unit cost - supplementary applications ($/acre) ______________($60/acre; p. 3-13)

   f. Lime cost - supplementary applications ($)
   Line 10a x Line 10b x Line 10e ______________

   g. Mobilization/demobilization cost ($/visit) ______________($105/visit; p. 3-13)

   h. pH maintenance cost ($)
   [(Line 10a + 1) x Line 10i] +
   Line 10d + Line 10f ______________

WORKSHEET H-5 (page 7)

11. Routine Maintenance and Repairs
    Subtotal ($)
    Line 1d + Line 2e + Line 3c +
    Line 4g + Line 5x + Line 6n +
    Line 7e + Line 81 + Line 9f
    Line 10h

WORKSHEET H-6

Severe Erosion Damage Repair

1. Soil Acquisition (On-Site Soil)

   a. Repairing frequency (visits/30 years ______

   b. Quantity of soil required (yd^3/visit) ______

   c. Excavation unit cost ($/$yd^3$) ______ (\$2.48/yd^3; p. 7-6)

   d. Placement and spreading unit cost ($/$yd^3$) ______ (\$2.25/yd^3; p. 7-6)

   e. Compaction unit cost ($/$yd^3$) ______ (\$1.04/yd^3; p. 7-6)

   f. Total on-site (native) soil unit cost ($/$yd^3$) Line 1c + Line 1d + Line 1e ______ (\$5.77/yd^3; pp. 7-6 - 7-9)

   g. Percent compaction (decimal < 1) ______ (0.25; p. 7-10)

   h. On-site (native) soil cost ($) Line 1a x Line 1b x Line 1f x (1 + Line 1g) ______

2. Soil Acquisition (Off-Site Soil)

   a. Quantity of soil required (yd^3/visit) ______

   b. Purchase unit cost ($/$yd^3$) ______ (\$6.56/yd^3; p. 7-26)

   c. Delivery unit cost ($/$yd^3$) ______ (\$2.61/yd^3; p. 7-26)

   d. Spreading unit cost ($/$yd^3$) ______ (\$1.03/yd^3; p. 7-26)

   e. Compaction unit cost ($/$yd^3$) ______ (\$1.22/yd^3; p. 7-26)

   f. Total off-site soil (topsoil) unit cost ($/$yd^3$) Line 2b + Line 2c + Line 2d + Line 2e ______ (\$11.42/yd^3; pp. 7-26 - 7-27)

   g. Percent compaction (decimal < 1) ______ (0.25; p. 7-10)

   h. Off-site soil (topsoil) cost ($) Line 1a x Line 2a x Line 2f x (1 + Line 2g) ______

WORKSHEET H-6 (page 2)

3. Heavy Equipment Mobilization/Demobilization

   a. Mobilization/demobilization of heavy equipment for soil repair cost ($/visit) ________ (p. 7-32)

   b. Mobilization/demobilization subtotal ($)
   Line 1a x Line 3a ________

4. Revegetation

   a. Area to be seeded, fertilized, and mulched (acres/visit) ________

   b. Seed unit cost ($/acre) ________ ($795/acre; p. 7-31)

   c. Seeding cost ($)
   Line 1a x Line 4a x Line 4b ________

   d. Fertilizer unit cost ($/acre) ________ ($176/acre; p. 7-31)

   e. Fertilizing cost ($)
   Line 1a x Line 4a x Line 4d ________

   f. Mulch unit cost ($/acre) ________ ($1048/acre; p. 7-31)

   g. Mulching cost ($)
   Line 1a x Line 4a x Line 4h ________

   h. Heavy equipment mobilization/demobilization cost ($/visit) ________ ($105/visit; p. 7-32)

   i. Revegetation subtotal ($)
   Line 4c + Line 4e + Line 4g
   + (Line 1a x Line 4h) ________

5. Severe Erosion Damage Repair and Revegetation Subtotal ($)
Line 1h + Line 2h + Line 3b + Line 4i ☐

WORKSHEET H-7

Leachate Management (if Applicable)

1. Leachate Collection

   a. Leachate removal frequency (visits/30 yrs) ________________

   b. Leachate quantity (gal/visit) ________________

   c. Time required for pumping (hrs/visit)
   Line 1b ÷ 8000
   (round to nearest integer) ________________

   d. Pumping unit cost, including pump rental ($/hr) ________________ ($25.70/hr; p. 4-11)

   e. Pumping cost ($)
   Line 1a x Line 1c x Line 1d ________________

2. On-Site Treatment of Leachate*

   a. Quantity of leachate to be treated (gal/visit) ________________

   b. Chemicals required for treatment (lb/gal leachate or gal/gal leachate) ________________ (pp. 4-12 - 4-13)

   c. Chemicals unit cost ($/lb or $/gal) ________________

   d. Chemicals cost ($)
   Line 1a x Line 2a x Line 2b x Line 2c ________________

   e. Electricity required for treatment (kwh/gal leachate) ________________ (pp. 4-12 - 4-13)

   f. Electricity unit cost ($/kwh) ________________ ($0.05/kwh; p. 4-2)

   g. Electricity cost ($)
   Line 1a x Line 2a x Line 2e x Line 2f ________________

   h. Water required for treatment (gal/gal leachate) ________________ (pp. 4-12 - 4-13)

   i. Water unit cost ($/1000 gal) ________________ ($1.22/1000 gal; p. 4-2)

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* On-site leachate management during post-closure should be included only in situations where a waste management unit has undergone partial closure.

WORKSHEET H-7 (page 2)

j. Water cost ($)
[(Line 1a x Line 2a x Line 2h) ÷ 1000] x Line 2i ________

k. Fuel required for treatment (MMBtu/gal leachate) ________(pp. 4-12 - 4-13)

l. Fuel unit cost ($/MMBtu) ________(p. 4-2)

m. Fuel cost ($)
Line 1a x Line 2a x Line 2k x Line 2l ________

n. Labor required for treatment (hrs/gallon leachate) ________(pp. 4-12 - 4-13)

o. Process operator unit labor cost ($/hr) ________($26.50/hr; p. 9-4)

p. Labor cost ($)
Line 1a x Line 2a x Line 2n x Line 2o ________

q. On-site treatment cost ($)
Line 2d + Line 2g + Line 2j + Line 2m + Line 2p ________

r. Residue generated from treatment (gal/visit) ________

3. Treated Leachate Discharge to Sewer

a. Volume of liquid dishcarged (gal/visit)

b. Sewer discharge unit cost ($/1000 gal) ________($1.50/1000 gal; p. 4-2)

c. Sewer discharge cost ($)
Line 1a x (Line 3a ÷ 1000) x Line 3b ________

4. Off-Site Management of Leachate and/or Treatment Residue

a. Quantity to be managed off-site (tons/visit) ________*

b. Truck capacity (tons) ________

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* Conversion factors are provided in the Volume III appendix.

WORKSHEET H-7 (page 3)

c. Number of loads/visit
Line 4a ÷ Line 4b
(round up to nearest integer) ________________

d. One-way distance (mi/load) ________________

e. Transportation unit cost ($/mi) ________________ ($4.50/mi; p. 4-15)*

f. Transportation cost ($)
Line 1a x Line 4c x Line 4d
x Line 4e ________________

g. Off-site management unit
cost ($/ton) ________________ (pp. 4-13 - 4-20)

h. Off-site management cost ($)
Line 1a x Line 4a x Line 4g ________________

i. Off-site management subtotal ($)
Line 4f + Line 4h ________________

5. Solidification Prior to On-Site Landfill Disposal**

a. Quantity to be solidified
(tons/visit) ________________***

b. Type of solidification material ________________

c. Solidification unit cost ($/ton) ________________ (p. 4-11)

d. Solidification cost ($)
Line 1a x Line 5a x Line 5c ________________

e. Change in waste quantity
(factor $\geq$ 1) ________________ (1.0; p. 4-11)

f. Final solidified waste
quantity (tons)
Line 5a x (1 + Line 5e) ________________

6. On-Site Disposal**

Include volume on one or more worksheets:
Landfill Inventory - Line 1b, Line 1f, Line 1g, Line 1p, Line 1r
Incinerator Inventory - Line 1j, Line 1k, Line 1m, Line 1n, Line 1q
Land Treatment Inventory - Line 1h, Line 1m, Line 1n, Line 1o, Line 1p

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* Based on a 250-mile one-way distance.

** On-site management of leachate/treatment residue should be included only in situations where a waste management unit has undergone partial closure.

*** Conversion factors are provided in the Volume III appendix.

WORKSHEET H-7 (page 4)

7. Leachate Collection System Inspection

   a. Inspection frequency (insp/30 yrs) ______________

   b. Inspection time required (hrs/insp) ______________

   c. Technician unit labor cost ($/hr) ______________ ($20.50/hr; p. 9-4)

   d. Inspection cost ($) Line 7a x Line 7b x Line 7c ______________

8. Leachate Collection System Maintenance

   a. Number of pumps replaced during post-closure (pumps/30 yrs) ______________

   b. Pump unit cost ($/pump) ______________ (p. 3-4)

   c. Maintenance frequency (visits/30 yrs) ______________

   d. Time required for maintenance of sump and pump (hrs/visit) ______________

   e. Unit labor cost ($/hr) ______________ ($23/hr; p. 9-4)

   f. Leachate collection branches cleaning frequency during post-closure (cleaning/30 yrs) ______________

   g. Time required for cleaning branches (hrs/visit) ______________

   h. Cleaning unit cost ($/hr) ______________ ($35.35/hr; p. 3-3)

   i. Leachate system maintenance subtotal ($) (Line 8a x Line 8b) + (Line 8c x Line 8d x Line 8e) + (Line 8f x Line 8g x Line 8h) ______________

9. Leak Detection System Inspection

   a. Inspection frequency (insp/30 yrs) ______________

   b. Inspection time required (hrs/insp) ______________

   c. Technician unit labor cost ($/hr) ______________ ($20.50/hr; p. 9-4)

   d. Inspection cost ($) Line 9a x Line 9b x Line 9c ______________

WORKSHEET H-7 (page 5)

10. Leak Detection System Maintenance

a. Number of pumps replaced during post-closure (pumps/30 years) ____________

b. Pump unit cost ($/pump) ____________ (p. 3-4)

c. Maintenance frequency (visits/30 yrs) ____________

d. Time required for maintenance of system (hrs/visit) ____________

e. Unit labor cost ($/hr) ____________ ($23/hr; p. 9-4)

f. Maintenance cost ($) (Line 10a x Line 10b) + (Line 10c x Line 10d x Line 10e) ____________

11. Leachate Management Subtotal ($) Line 1e + Line 2q + Line 3c + Line 4i + Line 5d + Line 7d + Line 8i + Line 9d + Line 10f

WORKSHEET H-8, PART 264 ONLY

Groundwater Monitoring

1. Detection Monitoring - Background/ Upgradient Wells

   a. Detection monitoring frequency for background/upgradient wells (visits/30 yrs) __________ (minimum of quarterly for one year; p. 2-3)

   b. Number of wells sampled per visit (wells/visit) __________

   c. Number of samples collected per well (samples/well) __________

   d. Number of replicate analyses per sample (replicates/sample) __________

   e. Number of analyses per visit Line 1b x Line 1c x Line 1d __________ (minimum of 4)

   f. Sample collection and preparation time required (hrs/well) __________ (4 hrs/well; p. 2-9)

   g. Transportation time to and from site (hrs/visit) __________

   h. Contract lab technician unit labor cost ($/hr) __________ ($20.50/hr; p. 9-4)

   i. Sample collection time (hrs/visit) (Line 1b x Line 1f + Line 1g) __________

   j. Sampling cost ($/visit) Line 1h x Line 1i __________

   k. Contract lab fee ($/analysis) __________ (p. 2-10)

   l. Contract lab cost ($/visit) Line 1e x Line 1k __________

   m. Upgradient/background detection monitoring cost ($) Line 1a x (Line 1j + Line 1l) __________

WORKSHEET H-8, PART 264 ONLY (page 2)

2. Detection Monitoring - Compliance Point/Downgradient Wells

   a. Detection monitoring frequency for compliance point/downgradient wells (visits/30 yrs) ______________ (at least semi-annually; p. 2-3)

   b. Number of wells sampled per visit (wells/visit) ______________

   c. Number of samples collected per well (samples/well) ______________

   d. Number of replicate analyses per sample (replicates/sample) ______________

   e. Number of analyses per visit Line 2b x Line 2c x Line 2d ______________

   f. Sample collection and preparation time required (hrs/well) ______________ (4 hrs/well; p. 2-9)

   g. Transportation time to and from site (hrs/visit) ______________

   h. Contract lab technician unit labor cost ($/hr) ______________ ($20.50/hr; p. 9-4)

   i. Sample collection time (hrs/visit) (Line 2b x Line 2f) + Line 2g ______________

   j. Sampling cost ($/visit) Line 2h x Line 2i ______________

   k. Contract lab fee ($/analysis) ______________ (p. 2-10)

   l. Contract lab cost ($/visit) Line 2e x Line 2k ______________

   m. Downgradient/compliance point detection monitoring cost ($) Line 2a x (Line 2j + Line 2l) ______________

WORKSHEET H-8, PART 264 ONLY (page 3)

3. Compliance Monitoring - Background/Upgradient Wells

   a. Compliance monitoring frequency for background/upgradient wells (visits/30 yrs) ____________ (minimum of quarterly for one year; p. 2-4)

   b. Number of wells sampled per visit (wells/visit) ____________

   c. Number of samples collected per well (samples/well) ____________

   d. Number of replicate analyses per sample (replicates/sample) ____________

   e. Number of analyses per visit Line 3b x Line 3c x Line 3d ____________ (minimum of 4)

   f. Sample collection and preparation time required (hrs/well) ____________ (4 hrs/well; p. 2-9)

   g. Transportation time to and from site (hrs/visit) ____________

   h. Contract lab technician unit labor cost ($/hr) ____________ ($20.50/hr; p. 9-4)

   i. Sample collection time (hrs/visit) (Line 3b x Line 3f) + Line 3g ____________

   j. Sampling cost ($/visit) Line 3h x Line 3i ____________

   k. Contract lab fee ($/analysis) ____________ (p. 2-10)

   l. Contract lab cost ($/visit) Line 3e x Line 3k ____________

   m. Upgradient/background compliance monitoring cost ($) Line 3a x (Line 3j + Line 3l) ____________

WORKSHEET H-8, PART 264 ONLY (page 4)

4. Compliance Monitoring - for Selected Hazardous Constituents at Compliance Point/Downgradient Wells

   a. Compliance monitoring frequency for hazardous constituents at downgradient wells (visits/30 yrs) ______________ (quarterly; p. 2-4)

   b. Number of wells sampled per visit (wells/visit) ______________

   c. Number of samples collected per well (samples/well) ______________

   d. Number of replicate analyses per sample (replicates/sample) ______________

   e. Number of analyses per visit Line 4b x Line 4c x Lind 4d ______________

   f. Sample collection and preparation time required (hrs/well) ______________ (4 hrs/well; p. 2-9)

   g. Transportation time to and from site (hrs/visit) ______________

   h. Contract lab technician unit labor cost ($/hr) ______________ ($20.50/hr; p. 9-4)

   i. Sample collection time (hrs/visit) (Line 4b x Line 4f) + Line 4g ______________

   j. Sampling cost ($/visit) Line 4h x Line 4i ______________

   k. Contract lab fee ($/analysis) ______________ (p. 2-10)

   l. Contract lab cost ($/visit) Line 4e x Line 4k ______________

   m. Downgradient hazardous constituents compliance monitoring cost ($) Line 4a x (Line 4j + Line 4l) ______________

WORKSHEET H-8, PART 264 ONLY (page 5)

5. Compliance Monitoring - for Appendix VIII Constituents at Compliance Point/ Downgradient Wells

a. Compliance monitoring frequency for Appendix VIII constituents at downgradient wells (visits 30/yrs) ______________(annually; p. 2-4)

b. Number of wells sampled per visit (wells/visit) ______________

c. Number of samples collected (samples/well) ______________

d. Number of replicate analyses per sample (replicates/sample) ______________

e. Number of analyses per visit Line 5b x Line 5c x Line 5d ______________

f. Sample collection and preparation time required (hrs/well) ______________(4 hrs/well; p. 2-9)

g. Transportation time to and from site (hrs/visit) ______________

h. Contract lab technician unit labor cost ($/hr) ______________($20.50/hr; p. 9-4)

i. Sample collection time (hrs/visit) (Line 5b x Line 5f) + Line 5g ______________

j. Sampling cost ($/visit) Line 5h x 5i

k. Contract lab fee (analysis) ______________(p. 2-10)

l. Contract lab cost ($/visit) Line 5e x Line 5k ______________

m. Downgradient Appendix VIII constituents monitoring cost ($) Line 5a X (Line 5j + Line 5l) ______________

WORKSHEET H-8, PART 264 ONLY (page 6)

6. Monitoring Well Inspection

   a. Inspection frequency (insp/30 yrs) ______________

   b. Inspection time required (hrs/insp) ______________

   c. Technician unit labor cost ($/hr) ______________($20.50/hr; p. 9-4)

   d. Inspection cost ($) Line 6a x Line 6b x Line 6c ______________

7. Monitoring Well Maintenance

   a. Maintenance frequency (visits/30 yrs) ______________

   b. Number of monitoring wells needing maintenance per visit ______________

   c. Maintenance time required (hrs/well) ______________

   d. Unit labor cost ($/hr) ______________($23/hr; p. 9-4)

   e. Monitoring well maintenance cost ($) Line 7a x Line 7b x Line 7c x Line 7d ______________

8. Monitoring Well and Parts Replacement

   a. Number of wells needing replacement during post-closure period ______________

   b. Existing monitoring well sealing unit cost ($/well) ______________($300/well; p. 3-5)*

   c. New monitoring well construction unit cost ($/well) ______________($4125/well; p. 3-5)*

   d. Mobilization/demobilization ($) ______________($150; p. 3-5)

   e. Monitoring well replacement cost ($) [Line 8a x (Line 8b + Line 8c)] + Line 8e ______________

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* Based on a depth of 100 vertical lineal feet.

WORKSHEET H-8, PART 264 ONLY (page 7)

f. Number of pumps needing replacement during post-closure period ____________ (p. 3-5)

g. Pump unit cost ($/pump) ____________

h. Pump cost ($)
Line 8f x Line 8g ____________

i. Number of wells needing tubing replacement during post-closure period ____________

j. Length of tubing (ft/well) ____________

k. Tubing unit cost ($/ft) ____________

l. Tubing replacement cost ($)
Line 8i x Line 8j x Line 8k ____________

m. Number of wells needing cap replacement during post-closure period ____________

n. Well cap unit cost ($/cap) ____________

o. Well cap replacement cost ($)
Line 8m x Line 8n ____________

p. Monitoring well and parts replacement cost ($)
Line 8e + Line 8h + Line 8l + Line 8o ____________

9. Post-Closure Groundwater Monitoring Subtotal ($)
Line 1m + Line 2m + Line 3m + Line 4m + Line 5m + Line 6d + Line 7e + Line 8p ☐

WORKSHEET H-8, PART 265 ONLY

Groundwater Monitoring

1. Primary Drinking Water Parameters Analysis - Background/Upgradient and Downgradient Wells

a. Number of wells ______________ (minimum of 4; p. 2-1)

b. Number of samples collected per well (samples/well) ______________

c. Number of replicate analyses per sample (replicates/sample) ______________

d. Number of analyses Line 1a x Line 1b x Line 1c ______________

e. Sample collection and preparation time required (hrs/well) ______________ (4 hrs/well; p. 2-6)

f. Transportation time to and from site (hrs) ______________

g. Contract lab technician unit labor cost ($/hr) ______________ ($20.50/hr; p. 9-4)

h. Sample collection time (hrs) (Line 1a x Line 1e) + Line 1f ______________

i. Sampling cost ($) Line 1g x Line 1h ______________

j. Contract lab fee ($/analysis) ______________ ($585/analysis; p. 2-8)

k. Contract lab cost ($) Line 1d x Line 1j ______________

l. Number of times background drinking water samples are collected during post-closure ______________ (quarterly for one year; p. 2-2)

m. Background drinking water parameters sampling cost ($) (Line 1i + Line 1k) x Line 1l ______________

WORKSHEET H-8, PART 265 ONLY (page 2)

2. Groundwater Quality Analysis - Background/Upgradient and Downgradient Wells

   a. Number of wells ________ (minimum of 4; p. 2-1)

   b. Number of samples collected per well (samples/well) ________

   c. Number of replicate analyses per sample (replicates/sample) ________

   d. Number of analyses Line 2a x Line 2b x Line 2c ________

   e. Sample collection and preparation time required (hrs/well) ________ (4 hrs/well; p. 2-4)

   f. Transportation time to and from site (hrs) ________

   g. Contract lab technician unit labor cost ($/hr) ________ ($20.50/hr; p. 9-4)

   h. Sample collection time (hrs) (Line 2a x Line 2e) + Line 2f ________

   i. Sampling cost ($) Line 2g x Line 2h ________

   j. Contract lab fee ($/analysis) ________ ($85/analysis; p. 2-5)

   k. Contract lab cost ($) Line 2d x Line 2j ________

   l. Number of times background groundwater quality samples are collected during post-closure ________ (quarterly for one year; p. 2-2)

   m. Background groundwater quality sampling cost ($) (Line 2i + Line 2k) x Line 2l ________

WORKSHEET H-8, PART 265 ONLY (page 3)

3. Groundwater Quality Analysis - Upgradient and Downgradient Wells

a. Groundwater quality monitoring frequency (visits/30 yrs) ______________(at least annually; p. 2-2)

b. Number of wells sampled per visit (wells/visit) ______________(minimum of 4; p. 2-1)

c. Number of samples collected per well (samples/well) ______________

d. Number of replicate analyses per sample (replicates/sample) ______________

e. Number of analyses per visit Line 3b x Line 3c x Line 3d ______________

f. Sample collection and preparation time required (hrs/well) ______________(4 hrs/well; p. 2-4)

g. Transportation time to and from site (hrs/visit) ______________

h. Contract lab technician unit labor cost ($/hr) ______________($20.50/hr; p. 9-4)

i. Sample collection time (hrs/visit) (Line 1b x Line 1f) + Line 1g ______________

j. Sampling cost ($/visit) Line 1h x Line 1i ______________

k. Contract lab fee ($/analysis) ______________($85/analysis; p. 2-5)

l. Contract lab cost ($/visit) Line 1e x Line 1k ______________

m. Groundwater quality analysis cost ($) Line 1a x (Line 1j + Line 1l) ______________

WORKSHEET H-8, PART 265 ONLY (page 4)

4. Groundwater Contamination Analysis - Background/Upgradient and Downgradient Wells

a. Number of wells ______________ (minimum of 4; p. 2-1)

b. Number of samples collected per well (samples/well) ______________

c. Number of replicate analyses per sample (replicates/sample) ______________ (4 replicates/sample; p. 2-2)

d. Number of analyses Line 4a x Line 4b x Line 4c ______________

e. Sample collection and preparation time required (hrs/well) ______________ (4 hrs/well; p. 2-6)

f. Transportation time to and from site (hrs) ______________

g. Contract lab technician unit labor cost ($/hr) ______________ ($20.50/hr; p. 9-4)

h. Sample collection time (hrs) (Line 4a x Line 4e) + Line 4f ______________

i. Sampling cost ($) Line 4g x Line 4h ______________

j. Contract lab fee ($/analysis) ______________ ($120/analysis; p. 2-7)

k. Contract lab cost ($) Line 3d x Line 3j ______________

l. Number of times background groundwater contamination samples are collected during post-closure ______________ (quarterly for one year; p. 2-2)

m. Background groundwater contamination sampling cost ($) (Line 3i + Line 3k) x Line 3l ______________

WORKSHEET H-8, PART 265 ONLY (page 5)

5. Groundwater Contamination Analysis - Upgradient and Downgradient Wells

   a. Groundwater contamination monitoring frequency (visits/30 yrs) ______________ (at least semi-annually; p. 2-2)

   b. Number of wells sampled per visit (wells/visit) ______________ (minimum of 4; p. 2-1)

   c. Number of samples collected per well (samples/well) ______________

   d. Number of replicate analyses per sample (replicates/sample) ______________ (4 replicates/sample; p. 2-2)

   e. Number of analyses per visit Line 5b x Line 5c x Line 5d ______________

   f. Sample collection and preparation time required (hrs/well) ______________ (4 hrs/well; p. 2-6)

   g. Transportation time to and from site (hrs/visit) ______________

   h. Contract lab technician unit labor cost ($/hr) ______________

   i. Sample collection time (hrs/visit) (Line 5b x Line 5f) + Line 5g ______________ ($20.50/hr; p. 9-4)

   j. Sampling cost ($/visit) Line 5h x Line 5i ______________

   k. Contract lab fee ($/analysis) ______________ ($120/analysis; p. 2-7)

   l. Contract lab cost ($/visit) Line 5e x Line 5k ______________

   m. Groundwater contamination analysis cost ($) Line 5a x (Line 5j + Line 5l) ______________

WORKSHEET H-8, PART 265 ONLY (page 6)

6. Monitoring Well Inspection

   a. Inspection frequency (insp/30 yrs) ____________

   b. Inspection time required (hrs/insp) ____________

   c. Technician unit labor cost ($/hr) ____________ ($20.50/hr; p. 9-4)

   d. Inspection cost ($) Line 6a x Line 6b x Line 6c ____________

7. Monitoring Well Maintenance

   a. Maintenance frequency (visits/30 yrs) ____________

   b. Number of monitoring wells needing maintenance per visit ____________

   c. Maintenance time required (hrs/well) ____________

   d. Unit labor cost ($/hr) ____________ ($23/hr; p. 9-4)

   e. Monitoring well maintenance cost ($) Line 7a x Line 7b x Line 7c x Line 7d ____________

8. Monitoring Well and Parts Replacement

   a. Number of wells needing replacement during post-closure period ____________

   b. Existing monitoirng well sealing unit cost ($/well) ____________ ($300/well; 3-5)*

   c. New monitoring well construction unit cost ($/well) ____________ ($4125/well; p. 3-5)*

   d. Mobilization/demobilization ($) ____________ ($150; p. 3-5)

   e. Monitoring well replacement cost ($) [Line 8a x (Line 8b + Line 8c)] + Line 8d ____________

   f. Number of pumps needing replacement during post-closure period ____________ (p. 3-5)

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* Based on a depth of 100 vertical lineal feet.

WORKSHEET H-8, PART 265 ONLY (page 7)

g. Pump unit cost ($/pump) __________

h. Pump cost ($)
Line 8f x Line 8g __________

i. Number of wells needing tubing replacement during post-closure period __________

j. Length of tubing (ft/well) __________

k. Tubing unit cost ($/ft) __________(p. 3-5)

l. Tubing replacement cost ($)
Line 8i x Line 8j x Line 8k __________

m. Number of wells needing cap replacement during post-closure period __________

n. Well cap unit cost ($/cap) __________

o. Well cap replacement cost ($)
Line 8m x Line 8n __________

p. Monitoring well and parts replacement cost ($)
Line 8e + Line 8h + Line 8l + Line 8o __________

9. Post-Closure Groundwater Monitoring Subtotal ($)
Line 1m + Line 2m + Line 3m + Line 4m + Line 5m + Line 6d + Line 7e + Line 8p ☐

WORKSHEET H-9

Gas Monitoring (if Applicable)

1. Monitoring

   a. Gas monitoring frequency (visits/30 yrs) __________

   b. Number of wells monitored per visit (wells/visit) __________

   c. Time required to monitor well (hrs/well) __________ (0.25 hr/well; p. 2-17)

   d. Contract lab technician unit labor cost ($/hr) __________ ($20.50/hr; p. 9-4)

   e. Gas monitoring subtotal ($) Line 1a x Line 1b x Line 1c x Line 1d __________

2. Gas Monitoring Well Inspection

   a. Inspection frequency (insp/30 yrs) __________

   b. Inspection time required (hrs/insp) __________

   c. Contract lab technician unit labor cost ($/hr) __________ ($20.50/hr; p. 9-4)

   d. Inspection cost ($) Line 2a x Line 2b x Line 2c __________

3. Gas Monitoring Well Maintenance

   a. Maintenance frequency (visits/30 yrs) __________

   b. Monitoring wells needing maintenance per visit __________

   c. Maintenance time required (hrs/well) __________

   d. Unit labor cost ($/hr) __________ ($23/hr; p. 9-4)

   e. Monitoring well maintenance cost ($) Line 3a x Line 3b x Line 3c x Line 3d __________

4. Gas Monitoring Subtotal ($) Line 1e + Line 2d + Line 3e ☐

WORKSHEET H-10

Soil Monitoring

1. Soil Core Monitoring

   a. Monitoring frequency (visits/30 yrs) ______________

   b. Samples taken per visit (samples/visit) ______________

   c. Sample collection time required (hrs/sample) ______________(1 hr/sample; p. 2-12)

   d. Transportation time to and from site (hrs/visit) ______________

   e. Contract lab technician unit labor cost ($/hr) ______________($20.50/hr; p. 9-4)

   f. Sample collection time (hrs/visit) (Line 1b x Line 1c) + Line 1d ______________

   g. Sampling cost ($/visit) Line 1e x Line 1f ______________

   h. Contract lab fee ($/sample) ______________(p. 2-13)

   i. Contract lab cost ($/visit) Line 1b x Line 1h ______________

   j. Soil core monitoring cost ($) Line 1a x (Line 1g + Line 1i) ______________

2. Soil Monitoring Subtotal ($) Line 1j ☐

WORKSHEET H-11

Demonstration for Exemption from Post-Closure Care Activities For Land Treatment Units (if Applicable)

1. Soil Sampling

   a. Number of times background soil samples taken ______________

   b. Number of background samples taken per visit (samples/visit) ______________

   c. Number of background soil samples to be taken Line 1a x Line 1b ______________

   d. Number of treatment zone soil samples to be taken ______________

   e. Total number of samples collected Line 1c + Line 1d ______________

   f. Sample collection time required (hrs/sample) ______________(1 hr/sample; p. 2-12)

   g. Transportation time to and from site (hrs) ______________

   h. Contract lab technician unit labor cost ($/hr) ______________($20.50/hr; p. 9-4)

   i. Sample collection time (hrs) (Line 1e x Line 1f) + Line 1g ______________

   j. Sampling cost ($) (Line 1h x Line 1i) ______________

   k. Contract lab fee ($/sample) ______________(p. 2-13)

   l. Contract lab cost ($) Line 1e x Line 1k ______________

   m. Sample cost ($) Line 1j + Line 1l ______________

2. Statistical Evaluation

   a. Engineer time required (hrs) ______________

   b. Engineer unit labor cost ($/hr) ______________($45.50/hr; p. 9-4)

WORKSHEET H-11 (page 2)

c. Engineer cost ($)
Line 2a x Line 2b ____________

d. Clerical time required (hrs) ____________

e. Clerical unit labor cost ($/hr) ____________($18/hr; p. 9-4)

f. Clerical cost ($)
Line 2d x Line 2e ____________

g. Statistical evaluation cost ($)
Line 2c + Line 2f ____________

3. Demonstration Subtotal ($)
Line 1m + Line 2g ☐

WORKSHEET H-12

Certification of Post-Closure

1. Independent Registered Professional Engineer

    a. Initial review of post-closure plan (hrs) ______________(4 hrs; p. 8-5)

    b. Inspection frequency (inspections/yr) ______________(p. 8-4)

    c. Inspection time required (hrs/inspection) ______________(p. 8-4)

    d. Number of years of post-closure care (yrs) ______________(30 yrs)

    e. Inspection time required (hrs) Line 1b x Line 1c x Line 1d ______________

    f. Prepare final documentation (hrs) ______________(4 hrs; p. 8-5)

    g. Total professional engineer time required (hrs) Line 1a + Line 1e + Line 1f ______________

    h. Professional engineer unit labor cost ($/hr) ______________($45.50/hr; p. 8-4)

    i. Number of separate post-closures ______________

    j. Professional engineer cost ($) Line 1g x Line 1h x Line 1i ______________

2. Clerical*

    a. Clerical time required (hrs/inspection) ______________(4 hrs/insp; p. 8-4)

    b. Clerical unit labor cost ($/hr) ______________($18/hr; p. 8-4)

    c. Clerical cost ($) Line 1b x Line 2a x Line 2b x Line 1d ______________

3. Certification of Post-Closure Subtotal ($) Line 1j + Line 2c ☐

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* Clerical time should be included only if the Professional Engineer is operating independently in a single-person business.

CHAPTER 7

SUMMARY WORKSHEETS

This chapter contains the summary worksheets on which closure and post-closure costs for each technology can be added together to produce closure and post-closure cost estimates for the TSDF. These worksheets also include provision for reflecting regional cost differences, updating costs to current dollars, and including appropriate fees. The summary worksheets in this section are identical to those in Volume II, so if the user plans to use the summary worksheets in Volume II, these summary worksheets do not need to be used. The summary worksheets are as follows:

- Worksheet I-1 (Closure)
- Worksheet I-2 (Post-Closure)
- Worksheet I-3 (Contingent Closure)
- Worksheet I-4 (Contingent Post-Closure)

WORKSHEET I-1

Closure

1. Container Storage (Volume I)

   a. Inventory management cost ($)
   Worksheet A-1, Line 7 ______________

   b. Testing for soil contamination cost ($)
   Worksheet A-2, Line 3 ______________

   c. Decontamination cost ($)
   Worksheet A-3, Line 13 ______________

   d. Foundation/pad removal cost ($)
   Worksheet A-4, Line 8 ______________

   e. Removal of contaminated soil cost ($)
   Worksheet A-5, Line 8 ______________

   f. Certification of final closure cost ($)
   Worksheet A-6, Line 3 ______________

   g. Container storage subtotal ($)
   Line 1a + Line 1b + Line 1c +
   Line 1d + Line 1e + Line 1f ______________

2. Treatment and Storage Tank (Volume I)

   a. Inventory management cost ($)
   Worksheet B-1, Line 9 ______________

   b. Testing for soil contamination cost ($)
   Worksheet B-2, Line 3 ______________

   c. Decontamination cost ($)
   Worksheet B-3, Line 14 ______________

   d. Foundation/pad removal cost ($)
   Worksheet B-4, Line 8 ______________

   e. Tank removal cost ($)
   Worksheet B-5, Line 7 ______________

   f. Secondary containment system removal cost ($)
   Worksheet B-6, Line 9 ______________

WORKSHEET I-1 (page 2)

g. Removal of contaminated soil cost ($)
Worksheet B-7, Line 8 ______________

h. Certification of final closure cost ($)
Worksheet B-8, Line 3 ______________

i. Treatment and storage tank subtotal ($)
Line 2a + Line 2b + Line 2c + Line 2d + Line 2e + Line 2f + Line 2g + Line 2h ______________

3. Incineration (Volume I)

a. Inventory management cost ($)
Worksheet C-1, Line 10 ______________

b. Air quality monitoring cost ($)
Worksheet C-2, Line 3 ______________

c. Decontamination cost ($)
Worksheet C-3, Line 14 ______________

d. Testing for soil contamination cost ($)
Worksheet C-4, Line 3 ______________

e. Removal of contaminated soil cost ($)
Worksheet C-5, Line 8 ______________

f. Certification of final closure cost ($)
Worksheet C-6, Line 3 ______________

g. Incineration subtotal ($)
Line 3a + Line 3b + Line 3c + Line 3d + Line 3e + Line 3f ______________

4. Waste Pile (Volume II)

a. Inventory management cost ($)
Worksheet D-1, Line 6 ______________

b. Leachate and/or run-off management cost ($)
Worksheet D-2, Line 9 ______________

WORKSHEET I-1 (page 3)

c. Part 264 groundwater monitoring cost ($)
Worksheet D-3, Line 8 ______________

d. Part 265 groundwater monitoring cost ($)
Worksheet D-3, Line 5 ______________

e. Testing for soil contamination cost ($)
Worksheet D-4, Line 3 ______________

f. Decontamination cost ($)
Worksheet D-5, Line 13 ______________

g. Foundation/pad removal cost ($)
Worksheet D-6, Line 8 ______________

h. Containment/liner system removal cost ($)
Worksheet D-7, Line 8 ______________

i. Removal of contaminated soil cost ($)
Worksheet D-8, Line 8 ______________

j. Certification of partial closure cost ($)
Worksheet D-9, Line 3 ______________

k. Certification of final closure cost ($)
Worksheet D-10, Line 3 ______________

l. Waste pile subtotal ($)
Line 4a + Line 4b + Line 4c + Line 4d + Line 4e + Line 4f + Line 4g + Line 4h + Line 4i + Line 4j + Line 4k ______________

5. Surface Impoundment (Volume II)

a. Inventory management cost ($)
Worksheet E-1, Line 12 ______________

b. Leachate and/or run-off management cost ($)
Worksheet E-2, Line 9 ______________

WORKSHEET I-1 (page 4)

c. Part 264 groundwater monitoring
cost ($)
Worksheet E-3, Line 8 ______________

d. Part 265 groundwater monitoring
cost ($)
Worksheet E-3, Line 5 ______________

e. Inspection and repairs cost ($)
Worksheet E-4, Line 4 ______________

f. Testing for soil contamination
cost ($)
Worksheet E-5, Line 3 ______________

g. Decontamination cost ($)
Worksheet E-6, Line 10 ______________

h. Removal of contaminated soil
cost ($)
Worksheet E-7, Line 8 ______________

i. Containment/liner system
removal cost ($)
Worksheet E-8, Line 8 ______________

j. Final cover cost ($)
Worksheet E-9, Line 12 ______________

k. Revegetation cost ($)
Worksheet E-10, Line 6 ______________

l. Certification of partial closures
cost ($)
Worksheet E-11, Line 3 ______________

m. Survey plat - partial closures
cost ($)
Worksheet E-12, Line 4 ______________

n. Certification of final closure
cost ($)
Worksheet E-13, Line 3 ______________

o. Survey plat - final closure
cost ($)
Worksheet E-14, Line 4 ______________

WORKSHEET I-1 (page 5)

p. Surface impoundment subtotal ($)
Line 5a + Line 5b + Line 5c +
Line 5d + Line 5e + Line 5f +
Line 5g + Line 5h + Line 5i +
Line 5j + Line 5k + Line 5l +
Line 5m + Line 5n + Line 5o ______________

6. Land Treatment (Volume II)

a. Inventory management cost ($)
Worksheet F-1, Line 9 ______________

b. Run-on/run-off management
cost ($)
Worksheet F-2, Line 7 ______________

c. Part 264 groundwater monitoring
cost ($)
Worksheet F-3, Line 8 ______________

d. Part 265 groundwater monitoring
cost ($)
Worksheet F-3, Line 5 ______________

e. Inspection and repair cost ($)
Worksheet F-4, Line 5 ______________

f. Revegetation cost ($)
Worksheet F-5, Line 7 ______________

g. Repair of drainage channels
cost ($)
Worksheet F-6, Line 3 ______________

h. Soil monitoring cost ($)
Worksheet F-7, Line 5 ______________

i. Testing for soil contamination
cost ($)
Worksheet F-8, Line 3 ______________

j. Decontamination cost ($)
Worksheet F-9, Line 13 ______________

k. Removal of contaminated soil
cost ($)
Worksheet F-10, Line 8 ______________

WORKSHEET I-1 (page 6)

l. Certification of partial closures cost ($)
Worksheet F-11, Line 4 __________

m. Survey plat - partial closures cost ($)
Worksheet F-12, Line 4 __________

n. Survey plat - final closure cost ($)
Worksheet F-13, Line 4 __________

o. Survey plat - final closure cost ($)
Worksheet F-14, Line 4 __________

p. Land treatment subtotal ($)
Line 6a + Line 6b + Line 6c + Line 6d + Line 6e + Line 6f + Line 6g + Line 6h + Line 6i + Line 6j + Line 6k + Line 6l + Line 6m + Line 6n + Line 6o __________

7. Landfill (Volume II)

a. Inventory management cost ($)
Worksheet G-1, Line 6 __________

b. Leachate and/or run-off management cost ($)
Worksheet G-2, Line 9 __________

c. Gas monitoring cost ($)
Worksheet G-3, Line 4 __________

d. Part 264 groundwater monitoring cost ($)
Worksheet G-4, Line 8 __________

e. Part 265 groundwater monitoring cost ($)
Worksheet G-4, Line 5 __________

f. Inspection and repairs cost ($)
Worksheet G-5, Line 4 __________

g. Testing for soil contamination cost ($)
Worksheet G-6, Line 3 __________

h. Decontamination cost ($)
Worksheet G-7, Line 13 __________

WORKSHEET I-1 (page 7)

i. Removal of contaminated soil cost ($)
Worksheet G-8, Line 8 ____________

j. Final cover cost ($)
Worksheet G-9, Line 12 ____________

k. Revegetation cost ($)
Worksheet G-10, Line 6 ____________

l. Certification of partial closures cost ($)
Worksheet G-11, Line 3 ____________

m. Survey plat - partial closures cost ($)
Worksheet G-12, Line 4 ____________

n. Certification of final closure cost ($)
Worksheet G-13, Line 3 ____________

o. Survey plat - final closure cost ($)
Worksheet G-14, Line 4 ____________

p. Landfill subtotal ($)
Line 7a + Line 7b + Line 7c + Line 7d + Line 7e + Line 7f + Line 7g + Line 7h + Line 7i + Line 7j + Line 7k + Line 7l + Line 7m + Line 7n + Line 7o ____________

8. Closure Cost Subtotal ($)
Line 1g + Line 2i + Line 3g + Line 4l + Line 5p + Line 6p + Line 7p ☐

9. Cost Updating Factors
(Volume III Appendix)

a. Factor for EPA Region ____________

b. Factor for updating costs to current dollars (factor > 1) ____________

c. Updated cost ($)
Line 8 x Line 9a x Line 9b ____________

WORKSHEET I-1 (page 8)

10. Engineering Fee, Contractor's Overhead and Profit, and Contingency Factor (Volume III)

    a. Engineering fee (decimal < 1) ____________

    b. Contractor's O & P (decimal < 1) ____________

    c. Updated cost including fees ($) Line 9c x (1 + Line 10a) x (1 + Line 10b) ____________

    d. Contingency (factor ≤ 2) ____________(typical = 0.1 to 0.25; p. 10-6)

11. Total Closure Cost ($) Line 10c x (1 + Line 10d)

WORKSHEET I-2

Post-Closure

1. Land Disposal Facilities (Volume II)

   a. Notation on property deed - partial closures cost ($) Worksheet H-1, Line 4 ____________

   b. Notation on property deed - final closure cost ($) Worksheet H-2, Line 4 ____________

   c. Maintenance of waste management area boundaries cost ($) Worksheet H-3, Line 2 ____________

   d. Facility inspection cost ($) Worksheet H-4, Line 4 ____________

   e. Routine maintenance and repairs cost ($) Worksheet H-5, Line 11 ____________

   f. Severe erosion damage repair cost ($) Worksheet H-6, Line 5 ____________

   g. Leachate management cost ($) Worksheet H-7, Line 11 ____________

   h. Part 264 groundwater monitoring cost ($) Worksheet H-8, Line 9 ____________

   i. Part 265 groundwater monitoring cost ($) Worksheet H-8, Line 9 ____________

   j. Gas monitoring cost ($) Worksheet H-9, Line 4 ____________

   k. Soil monitoring cost ($) Worksheet H-10, Line 2 ____________

   l. Demonstration for exemption from post-closure activities for land treatment units cost ($) Worksheet H-11, Line 3 ____________

   m. Certification of post-closure cost ($) Worksheet H-12, Line 3 ____________

WORKSHEET I-2 (page 2)

2. Post-Closure Cost Subtotal ($)
Line 1a + Line 1b + Line 1c +
Line 1d + Line 1e + Line 1f +
Line 1g + Line 1h + Line 1i +
Line 1j + Line 1k + Line 1l +
Line 1m

3. Cost Updating Factors
(Volume III Appendix)

a. Factor for EPA Region ____________

b. Factor for updating costs to current dollars (factor > 1) ____________

c. Updated cost ($)
Line 2 x Line 3a x Line 3b ____________

4. Engineering Fee, Contractor's Overhead and Profit, and Contingency Factor (Volume III)

a. Engineering fee (decimal < 1) ____________

b. Contractor's O & P (decimal < 1) ____________

c. Updated cost including fees ($)
Line 3c x (1 + Line 4a) x
(1 + Line 4b) ____________

d. Contingency (factor $\leq$ 2) ____________(typical = 0.1 to 0.15; p. 10-6)

5. Total Post-Closure
Cost ($/yr)
Line 5 - 30

WORKSHEET I-3

Contingent Closure

1. Treatment and Storage Tank (Volume I)

   a. Inventory management cost ($)
   Worksheet B-1, Line 9 ______________

   b. Testing for soil contamination
   cost ($)
   Worksheet B-2, Line 3

   c. Decontamination cost ($)
   Worksheet B-3, Line 14 ______________

   d. Foundation/pad removal cost ($)
   Worksheet B-4, Line 8 ______________

   e. Tank removal cost ($)
   Worksheet B-5, Line 7 ______________

   f. Secondary containment system
   removal cost ($)
   Worksheet B-6, Line 9 ______________

   g. Removal of contaminated soil
   cost ($)
   Worksheet B-7, Line 8 ______________

   h. Certification of final closure
   cost ($)
   Worksheet B-8, Line 3 ______________

   i. Inspection and repairs cost ($)
   Worksheet B-9, Line 4 ______________

   j. Final cover cost ($)
   Worksheet B-10, Line 12 ______________

   k. Revegetation cost ($)
   Worksheet B-11, Line 6 ______________

   l. Groundwater monitoring well
   construction cost ($)
   Worksheet B-12, Line 5 ______________

   m. Part 264 groundwater monitoring
   cost ($)
   Worksheet B-13, Line 5 ______________

   n. Part 265 groundwater monitoring
   cost ($)
   Worksheet B-13, Line 6 ______________

WORKSHEET I-3 (page 2)

o. Survey plat - final closure
Worksheet B-14, Line 4 ______________

p. Treatment and storage tank
subtotal ($)
Line 2a + Line 2b + Line 2c +
Line 2d + Line 2e + Line 2f +
Line 2g + Line 2h + Line 2i +
Line 2j + Line 2k + Line 2l +
Line 2m + Line 2n + Line 2o ______________

2. Waste Pile (Volume II)

a. Inventory management cost ($)
Worksheet D-1, Line 6 ______________

b. Leachate and/or run-off
management cost ($)
Worksheet D-2, Line 9 ______________

c. Part 264 groundwater monitoring
cost ($)
Worksheet D-3, Line 8 ______________

d. Part 265 groundwater monitoring
cost ($)
Worksheet D-3, Line 5 ______________

e. Testing for soil contamination
cost ($)
Worksheet D-4, Line 3 ______________

f. Decontamination cost ($)
Worksheet D-5, Line 13 ______________

g. Foundation/pad removal cost ($)
Worksheet D-6, Line 8 ______________

h. Containment/liner system removal
cost ($)
Worksheet D-7, Line 8 ______________

i. Removal of contaminated soil
cost ($)
Worksheet D-8, Line 8 ______________

j. Certification of partial closures
cost ($)
Worksheet D-9, Line 3 ______________

WORKSHEET I-3 (page 3)

k. Certification of final closure cost ($)
Worksheet D-10, Line 3 ______________

l. Inspection and repairs cost ($)
Worksheet D-11, Line 4 ______________

m. Final cover cost ($)
Worksheet D-12, Line 12 ______________

n. Revegetation cost ($)
Worksheet D-13, Line 6 ______________

o. Survey plat - partial closures cost ($)
Worksheet D-14, Line 4 ______________

p. Survey plat - final closure cost ($)
Worksheet D-15, Line 4 ______________

q. Waste pile subtotal ($)
Line 1a + Line 1b + Line 1c + Line 1d + Line 1e + Line 1f + Line 1g + Line 1h + Line 1i + Line 1j + Line 1k + Line 1l + Line 1m + Line 1n + Line 1o + Line 1p ______________

3. Surface Impoundment (Volume II)

a. Inventory management cost ($)
Worksheet E-1, Line 12 ______________

b. Leachate and/or run-off management cost ($)
Worksheet E-2, Line 9 ______________

c. Part 264 groundwater monitoring cost ($)
Worksheet E-3, Line 8 ______________

d. Part 265 groundwater monitoring cost ($)
Worksheet E-3, Line 5 ______________

e. Inspection and repairs cost ($)
Worksheet E-4, Line 4 ______________

f. Testing for soil contamination cost ($)
Worksheet E-5, Line 3 ______________

WORKSHEET I-3 (page 4)

g. Decontamination cost ($)
Worksheet E-6, Line 10

h. Removal of contaminated soil cost ($)
Worksheet E-7, Line 8

i. Final cover cost ($)
Worksheet E-9, Line 12

j. Revegetation cost ($)
Worksheet E-10, Line 6

k. Certification of partial closures cost ($)
Worksheet E-11, Line 3

l. Survey plat - partial closures cost ($)
Worksheet E-12, Line 4

m. Certification of final closure cost ($)
Worksheet E-13, Line 3

n. Survey plat - final closure cost ($)
Worksheet E-14, Line 4

o. Surface impoundment subtotal ($)
Line 2a + Line 2b + Line 2c + Line 2d + Line 2e + Line 2f + Line 2g + Line 2h + Line 2i + Line 2j + Line 2k + Line 2l + Line 2m + Line 2n

4. Contingent Closure Cost Subtotal ($)
Line 1p + Line 2q + Line 3o

5. Cost Updating Factors
(Volume III Appendix)

a. Factor for EPA Region

b. Factor for updating costs to current dollars (factor > 1)

c. Updated cost ($)
Line 3 x Line 4a x Line 4b

WORKSHEET I-3 (page 5)

6. Engineering Fee, Contractor's Overhead and Profit, and Contingency Factor (Volume III)

   a. Engineering fee (decimal < 1) ________________

   b. Contractor's O & P (decimal < 1) ________________

   c. Updated cost including fees ($)
   Line 5c x (1 + Line 6a) x
   (1 + Line 6b) ________________

   d. Contingency (factor ≤ 2) ________________(typical = 0.1 to 0.25; p. 10-6)

7. Total Contingent Closure Cost ($)
Line 6c x (1 + Line 6d) ☐

WORKSHEET I-4

Contingent Post-Closure

1. Land Disposal Facilities (Volume III) (inlcudes tank facilities closed as landfills)
    a. Notation on property deed - partial closures cost ($)
    Worksheet H-1, Line 4

    b. Notation on property deed - final closure cost ($)
    Worksheet H-2, Line 4

    c. Maintenance of waste management area boundaries cost ($)
    Worksheet H-3, Line 2

    d. Facility inspection cost ($)
    Worksheet H-4, Line 4

    e. Routine maintenance and repairs cost ($)
    Worksheet H-5, Line 11

    f. Severe erosion damage repair cost ($)
    Worksheet H-6, Line 5

    g. Leachate management cost ($)
    Worksheet H-7, Line 11

    h. Part 264 groundwater monitoring cost ($)
    Worksheet H-8, Line 9

    i. Part 265 groundwater monitoring cost ($)
    Worksheet H-8, Line 9

    j. Certification of post-closure cost ($)
    Worksheet H-12, Line 3

2. Contingent Post-Closure Cost Subtotal ($)
    Line 1a + Line 1b + Line 1c + Line 1d + line 1e + Line 1f + Line 1g + Line 1h + Line 1i + Line 1j

WORKSHEET I-4 (page 2)

3. Cost Updating Factors (Volume III Appendix)
   - a. Factor for EPA Region __________
   - b. Factor for updating costs to current dollars (factor > 1) __________
   - c. Updated cost ($) Line 2 x Line 3a x Line 3b __________

4. Engineering Fee, Contractor's Overhead and Profit, and Contingency Factor (Volume III)
   - a. Engineering fee (decimal < 1) __________
   - b. Contractor's O & P (decimal < 1) __________
   - c. Updated cost including fees ($) Line 3c x (1 + Line 4a) x (1 + Line 4b) __________
   - d. Contingency (factor ≤ 2) __________ (typical = 0.1 to 0.15; p. 10-6)

5. Total Contingent Post-Closure Cost ($) Line 4c x (1 + Line 4d)

6. Annual Contingent Post-Closure Cost ($/yr) Line 5 - 30